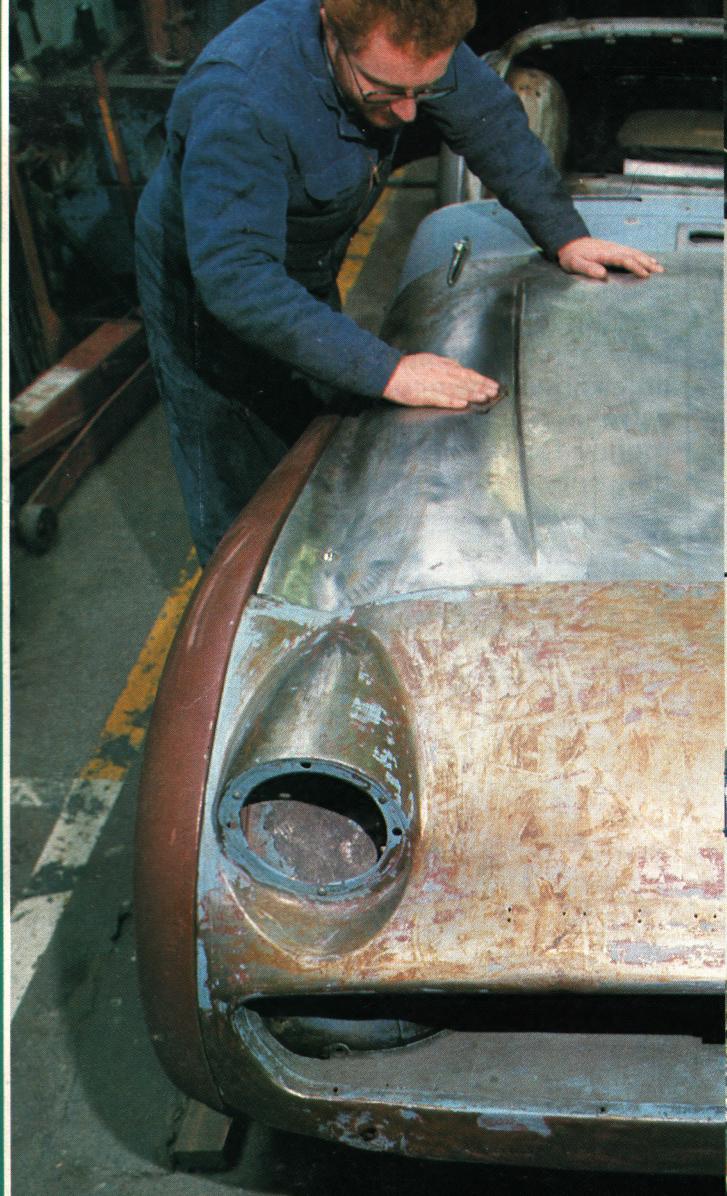


# Classic cars



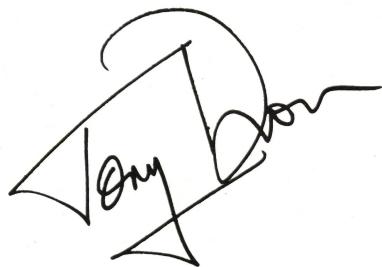
PRACTICAL  
**PAINTWORK**  
32-page SUPPLEMENT

# Classic cars

**L**AST summer I had a go at respraying the two sides of my Anglia. Until then I had never handled a proper paint-spraying kit but I did have considerable experience with those small aerosols and that was quite useful. Probably the kindest thing that could be said about the result, however, is that I did manage to get the car blue!

Maybe I am being a bit hard on myself: it's quite an acceptable job but I am only too well aware that a proper professional would have done it better and more quickly. However, as I went on, I did begin to acquire the right skills and that's the essence of my message here: don't give up! Give yourself a chance and it will turn out all right.

Get the right kit and the right surroundings, use some practice pieces until your confidence grows, and keep going! With careful rubbing down, believe me, you will surprise yourself with the result: even those orange-peel bits you didn't quite get right can end up looking fine! I hope that our advice in this month's supplement inspires some beginners to have a go.



Tony Dron  
Editor  
*Classic Cars*

## ACKNOWLEDGEMENTS

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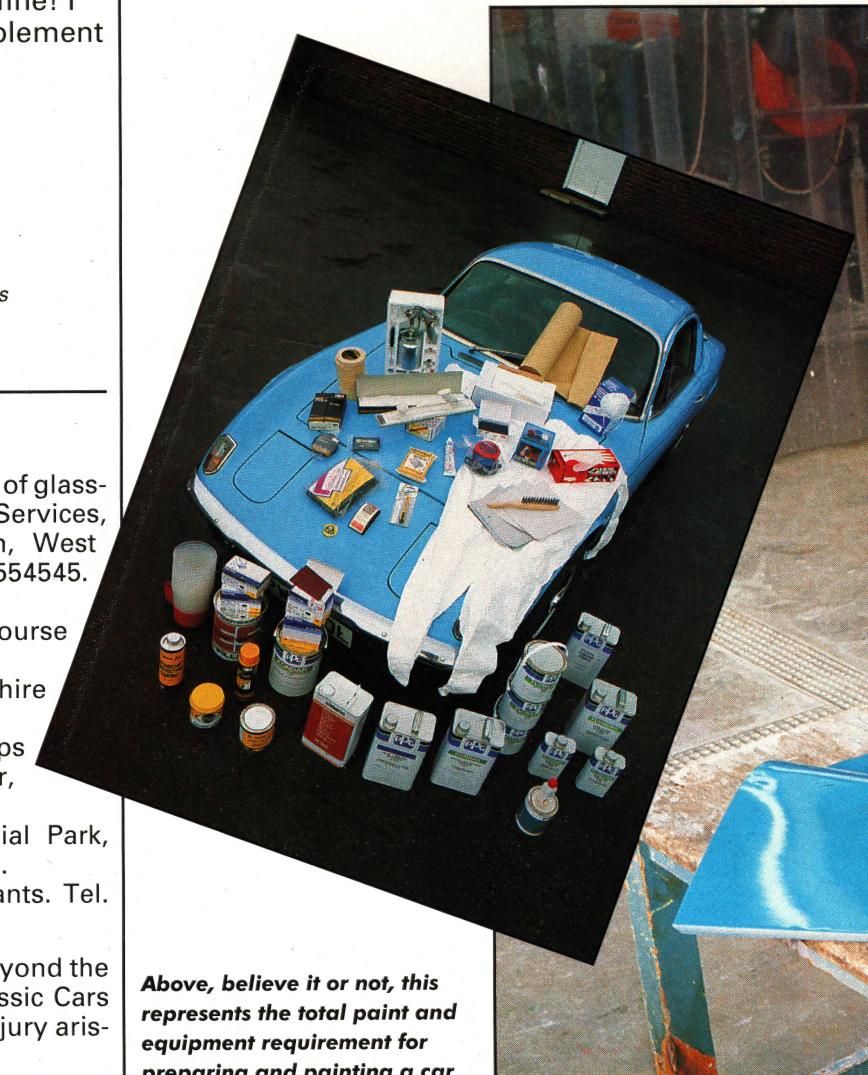
Complete safety and application notes are beyond the scope of this supplement, and therefore Classic Cars can accept no responsibility for damage or injury arising from its use.

# PAINTING Y

*Spray while you can; new legislation is limiting the home sprayer's options*

**A**N immaculately-painted car is enhanced in value and gives immense pleasure to its owner. Unfortunately the old adage 'you get what you pay for' is particularly true when applied to painting. Hopefully this supplement will help you understand why it costs so much to repaint a car properly, and what you can do yourself, whether to do the job in its entirety or to reduce the cost of a professional doing it.

Whatever the reasons for repainting – a change of colour, faded original paintwork, accident damage, too much rust or the wish to win a concours – the main concern is time. It takes an awfully long time to repaint a car properly, and too often people start work with enthusiasm but little knowledge or understanding: often with disastrous results and ultimately more waste of money for rectification. Time costs money and that superb blemish-free high-gloss finish that



# OUR CAR THE DIY WAY

will last for years and years, will be expensive, but anything less is almost bound to be disappointing.

Before embarking on any painting project, think about the amount of preparation needed. After all, the paint is just the 'icing on the cake'; bad preparation underneath will always show and spoil the 'icing'. Although outside the scope of this supplement, all repairs must be perfect. Removing rust by welding in new metal, repairing dents and scratches, leading, GRP work and sanding down filler all have to be done correctly. After the paint goes on you have no second chance, unless you do it all again! Many people start a repaint but run out of time and patience. To complete a medium-sized Classic car allow around 200-250 hours to cover stripping all the paint off, simple repairs and painting, then add the cost of materials and you will realise why a professional respray costs so much.

If you opt to have the work done by a professional, you are paying for his skills and experience; a good sprayer is worth his weight in gold and this will show in the result. Of course, there

are professionals and professionals, so choose by the recommendation of other owners in your car club or by seeing examples of the work done by a particular firm. This is especially true for GRP work; there are very few people who can repair and repaint in this medium properly.

The positive side of doing the job yourself will lie mainly in your sense of achievement at tackling another aspect of car rebuilding, though not many people will want to do it again! Doing some of the work yourself can save a great deal of time and money. You could strip the car of all its trim and, if brave enough, remove the paint and then let a professional carry on from there, refitting the trim afterwards. Many options are open and most professionals will be glad to discuss ways of helping you.

For the home sprayer, with new materials on the market and recent legislation, spraying in one's garage is becoming a dying art. Only cellulose should be used, not the modern two-pack paints. Spraying is an acquired skill; in the wrong hands and with the wrong materials it can be lethal.



# PAINT TYPES AND USES

*Some paints can kill: here's what you can and can't use at home*

**P**AINT, as used in the motor industry, is a liquid that dries in a coloured or clear film (lacquer) on a surface. All paints contain pigments – either natural or man-made. To produce metallic paints, aluminium particles (flecks) are added in varying grades to determine the coarseness of the overall effect.

Binders are used to hold the pigment particles together and allow the paint layer to form an even film. They also provide adhesion to the preceding layer. Finally there is the solvent which is the paint/binder carrier. The pigments are suspended in the solvent

(thinners) when applied; afterwards the solvent evaporates, leaving the hardened pigment/binder film on the surface. There are many types of paint:

**Cellulose.** Its proper title is nitro-cellulose lacquer. This paint is thinned down with solvent, mixed 50/50, for spraying and can be polished to a high degree of gloss. It's easy to use for 'spot repairs' and 'blow-ins' and ideal for the first-time sprayer, because mistakes can be rectified easily. A high content of solvent is used, so the covering power is not very good and multiple coats of paint are required. Cellulose is not as

flexible as the later 'plastic' paints and will dull with age if not kept polished.

**Synthetic enamel.** This is an air-drying enamel based on man-made resins, with drying oils added. Minimal solvent is incorporated and the paint covers with one or two coats to give a plastic film on the surface. Drying takes some 16 to 20 hours at 20°C but the surface is touch-dry in about four hours. This paint is not really recommended for the beginner because a mistake means the whole panel has to be re-done. You cannot 'spot repair' because the second application will just sit on the first and, being a plastic film, will not blend in as cellulose paint does. Advantages of synthetic enamel are that it is tough and durable, flexible in ser-

vice and more economical than cellulose as less paint is used. You also get a good gloss straight from the spraygun.

**Two-pack acrylic enamels** contain both acrylic and melamine (man-made) resins and when mixed with a hardener (hence 'two-pack') give all the attributes of an air-drying enamel but harden off much quicker at any given temperature. The hardener contains isocyanate and when sprayed the vapour is lethal, so external breathing apparatus must be used with a separate clean air supply. For this reason alone the novice should not use this system.

The major car manufacturers now use acrylic enamels that harden under a high-temperature bake in a paint oven. The resins in

## MATERIALS AND EQUIPMENT

*You don't just need paint to tackle a home respray*

**B**ODY repairs are outside the scope of this supplement but for the initial preparation proper files, for removing excess weld and lead, and a grinderette with a range of discs are useful. In addition you will need: masking tape in  $\frac{3}{4}$ in or 2in widths; tack rags; fillers; GRP materials; specialist files, which are invaluable; cork and rubber blocks and glasspaper. Wet-and-dry paper is required in grades of 40, 80, 120, 320, 600, 800 and 1,200 grit. The coarse 40 to 120 grades are used for rubbing off fillers, 320 and 600 for keying the surfaces and 1,200 for the final 'polish' of the finished surface.

Quantities of paint, resin and filler have to be worked out and with a cellulose respray that could mean up to ten litres of paint (including primer) plus thinners. Just the materials alone are expensive, with some two-pack paints now over £40 per litre, so a price of £400-£500 for a full strip and respray on a medium-sized car is about right, with larger cars costing more. This is one aspect that people fail to understand; paints and lacquers are expensive.

Equipment and conditions are very important for good results. Good overall lighting and ventilation are imperative; you can't paint in shadows. Ventilation is essential as the build-up of vapour is tremendous and if not dispersed quickly there is a potential danger to health. The spray area must be warm to an overall degree. Heat the area to 20-25°C, spray, then keep the temperature up until the paint has 'gone off'. A common mistake is to switch the





**Left, cellulose quantities for an average Classic car**

ing agents, requires no hardener and dries by solvent evaporation; used for solid and metallic colours.

Basecoat and clear systems are acrylic lacquer paints which can be polished to a high degree of gloss. Cellulose and acrylic paints are very similar in application, with acrylic systems having a harder and more durable finish than the traditional cellulose.

**Low-bake enamel** comes to full hardness in an oven at a lower temperature than the high-bake systems (TSA and TPA); temperatures used are around 80°C. The end result is a very high gloss, extremely tough and durable in service. The finish requires no polishing. It

them reform and flow uniformly, resetting to give a tough high-gloss finish. One system is TSA (thermosetting acrylic) which is used for solid colours and metallics. Here resins set together at 130°C and are

baked at this temperature for 30 minutes.

Another system is TPA (thermoplastic acrylic) where the resins re-flow at 160°C. This is used for solid colours and metallics.

A third system, used for

solid colours only, is high-bake synthetic enamel. It requires 30 minutes at 130°C to harden-off fully.

Other paint finishes available are:

**Acrylic lacquer**, based on acrylic resins and plasticis-



**Above, specialist sanding files, blocks and tape in various widths**

heat off; the drying paint then draws in the air moisture and blooms on the surface, or worse still blisters will appear much later. Use only a proper workshop space-heater, which can be hired.

Special clothing is not essential for painting but it is sensible to wear a one-piece overall to prevent loose clothing getting in the way. Apply masking tape to the sleeves and ankles to prevent the loose cuffs getting caught in the painting area as you lean over the roof or bonnet. Always, always wear a mask – preferably a proper charcoal-filter face mask which offers by far the best protection. However, a simple face mask is better than nothing; a mask should always be used when rubbing down fillers. Wear rubber-soled shoes while painting, to prevent sparks. Even if the car is sprayed outside in summer still adhere to the above.

The main equipment needed is, of course, the compressor and spraygun itself. Many types of spray equipment are available and I can only advise that you ask your local paint supplier to the trade, or your nearest professional spray shop, as to what type would be ideally suited to your particular needs. Do not buy or hire an electric spraygun, which is an airless gun driven by an electric motor. Such a gun may be ideal for spraying heavier materials (such as varnish on a flat wood panel) but is totally useless for spraying a car. The finish is awful and hours and hours of polishing will be needed.

Another type that is often advertised for the home sprayer is the constant-pressure type, a self-contained package that has a motor driving a compressor but no holding tank, so that a permanently-set pressure is delivered at the gun. This is called a constant-bleed gun. It is useful for a one-off job and fair-

# PAINT TYPES AND USES

must *not* be used on GRP bodies as the temperatures involved are too high and resin deformation will result.

**Air-drying synthetic enamel** and hardener. This is a standard air-drying finish that can be brought up to a two-pack specification, which shortens the drying time. These enamels can be low-baked as well but the finish will not be as hard as a true low-bake enamel.

As with paint systems, the primers are varied and it is vitally important to use the correct ones compatible with the paint scheme. Primers are used to provide a good key between the existing paint surface and

the new one to be applied, and initially to cover new or bare patches of metal or GRP.

## Primers

**Etch primer.** This is a conventional primer, but it contains phosphoric acid, which etches into the surface. Used on new metal and essential when painting aluminium panels.

**Cellulose or synthetic primer.** An ordinary primer, normally applied in two coats. These should never be flattened down, only 'de-nibbed' and are not designed to fill scratches and score marks.

**'Hi-build'** primer. This contains more pigments than the ordinary primer above and is used to fill minor sanding marks. Each coat gives a thicker layer than a normal primer; two or three coats are sprayed. These are flattened with 600 grade wet-and-dry glasspaper to give a perfect surface. The paint film must be

broken otherwise a further recoating is necessary.

**Spray filler** (ICI polyester spray filler). This is *not* the same as a hi-build primer and is a resin/chalk combination which is mixed with a hardener and then sprayed on; solvent is acetone. Each coat gives up to nine 'thou' (0.009in) thickness. This process is used extensively on new GRP bodies and on GRP repairs. Flattening off with 220 wet-and-dry paper must be followed by overcoating with a conventional primer. Spray filler will cover up to 80-grade sandpaper marks and has slight etching properties but *must be sprayed while using an external air supply*. This rules it out for DIY use.

**Non-sand** primer. This requires no flattening or 'de-nibbing', so top coats are sprayed directly onto its surface. It is *not* recommended for the home operator but is used in commercial bodyshops for minimum turnaround time.

**Chip-resistant** primer. This contains more plasticisers to help resist impact damage from stones and ideally is used on front and rear panels and sills. It can be overpainted with the body colour.

**Two-pack** primer. This will remove scratch marks and has no solvent to allow 'sinkage'; use instead of spray fillers. *It must be sprayed using an external air supply*.

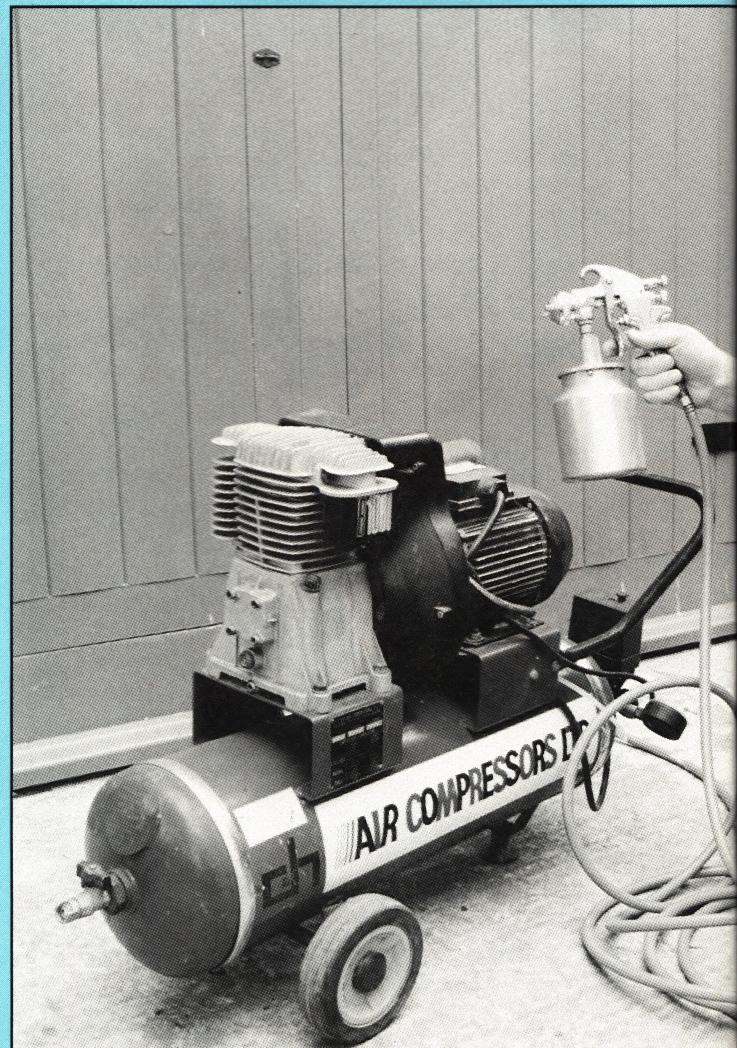
**Thinner** (solvents) come in many formulations and their correct use cannot be stressed too much. Cheap thinners ruin many resprays and it is essential to use the same make of thinner as the paint. Thinners come in a range of applications and for cellulose there are: Slow for hot weather; Non-Bloom for use in adverse damp conditions; Fast for normal application; Part Repair, which is self explanatory. There are different synthetic thinners as well; some used for air-drying and others for

## MATERIALS AND EQUIPMENT

ly cheap to buy but very noisy as the motor is running permanently. Reasonable results can be achieved and the compressed-air supply can be used for other jobs.

The 'normal' type utilises a proper compressor supplying air to the gun. Small units have an electric motor driving a compressor, which supplies compressed air to a holding tank, and can be wheeled about on their own wheels. Large units may have an external holding tank. The unit of measure is cfm which stands for cubic feet per minute and a compressor rating of 3cfm means that the tank will hold a constant rating of three cubic feet a minute. If buying or hiring a compressor it is essential that you obtain one of the correct rating. One of 4.5cfm will be sufficient for a respray. With a smaller capacity, the supply of air will not keep up with the demands of the gun, so you will always be waiting for the compressor to catch up, and the results will suffer. Make sure that a regulator is fitted, as you want to know what pressure you are spraying at (usually 45-60psi). In any case the compressor will shut off at anywhere between 120-200psi. If you are buying a compressor, be guided by your local factor; air lines and fittings must be of the correct type.

Sprayguns and their prices vary enormously; again be guided by your local factor. Unless you are going to spray many vehicles, you do not need a top-of-the-range type such as De Vilbiss; a good medium-priced gun will suffice. Some cheap ones are really only good for primers, chassis black or even for spraying Waxoyl. You will need to ask for guidance on jet sizes and state the paint system with which the gun is going to be used.



low-bake schedules.

**Stopper** (knifing stopper, or putty). This is heavily pigmented putty, used to fill deep score and scratch marks, and pinholes in fillers. Apply by plastic spreader or broad knife, in thin layers; all the solvent must evaporate before overcoating.

Stoppers can be obtained for spray application and come in two forms: nitro-cellulose and two-pack polyester. The latter hardens by chemical means, so drying in between coats will not present a problem, and is used on synthetic systems and on GRP bodies. After drying, the stopper is flattened with 600-grade wet-and-dry paper (used wet) and must be primed. On most GRP bodies, spray filler is used instead of stopper.

### Sealers and isolators

These are used to prevent the old surface from wrinkling up or bleeding through the new finish. Most use

methyl alcohol as the solvent. Nothing will hold back more than two or three coats of paint; on any vehicle the only way to obtain a lasting finish is to strip it all off and start again. Sealers will not hold back flaky paintwork, nor will some of them allow the mixing of different paint systems. Synthetic can be sprayed on cellulose but not the other way round. All sealers/isolators must not be flattened, so they *must be overcoated* with primer before flattening takes place.

Really cellulose is the only system for use by the home sprayer. Spray fillers and two-pack paints should not be used at all unless spraying is done in a professional booth with the correct apparatus; it is far too dangerous otherwise.

Resins are derived from petroleum and are in fact solids but are dissolved in styrene (which gives the characteristic smell) to give the liquid state. Lay-up resin is used for all normal pur-

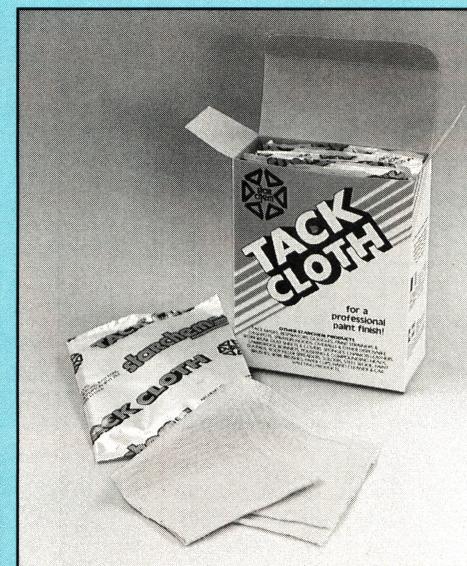
poses, gel-coat resin is a thicker resin used in mouldings as the first layer, known as the gel coat. Resin 'goes off' with either liquid or paste hardener (methyl ethyl ketone peroxide) and its rate of reaction is dependent upon temperature and the amount of hardener used. Glassfibre mat is strands of silicon laid in a random fashion in varying densities (weights) dressed with a chemical to give ease of handling. Tissue mat is an ultra-fine form used to repair cracks in the gel coat and woven roving consists of hanks of glass mat woven together in either fine or coarse form. Acetone is the solvent for resins; use while they're still liquid. Fillers are chalk dust mixed in resin to give a creamy dough and, like resin, are dependent on temperature and hardener to 'go off'. Fillers are used in all aspects of body repair, both on metal- and GRP-bodied cars, and are very versatile indeed. Resin

pastes (shredded mat in resin) are a quick, cheap (and nasty) way to bodge repairs but, correctly applied, they have their uses on GRP. They should not be used on metal. As with paints care must be taken; never use a glass mixing container as the heat of the reaction will shatter it. Acetone has a flash-point of -11°C and must be kept cool but above this temperature.

### Metals

As we all know, steel rusts and then becomes weaker until all structural strength is lost. Steel stretches and deforms and then will have undue stresses and strains on it; a stressed-steel part will weaken with age.

Aluminium is a light, soft malleable metal which is usually stretched over a wood or metal framework and thus is not stressed. It does not rust but will powder with age if left exposed to the atmosphere; very durable if looked after.



**Right, ask for the literature that goes with the paint system you are using when buying your paint – and read it thoroughly!**

**Left, the correct compressor is essential. Make sure it features a holding tank of at least 4.5cfm capacity, a water trap and a cleaning filter on the air intake**



**Left, 'tack' cloths are essential for removing dust from panels before spraying**

# PREPARATION FOR PAINT

***Painting is the easy bit: it's the more time-consuming preparation that counts***

**T**HREE are many decisions to be made here: just to mask up the car and do a quick 'blow-over', which is not really satisfactory; to semi-strip the car of everything (including taking the body off the chassis if applicable); or to strip the car and remove all the old paint as well. The last option is the only way to achieve a perfect result and is, of course, the most expensive in terms of cost and time. However, this is justified in terms of longevity of the finish. Satisfactory finishes can never be achieved on top of

net channels can be painted properly – not just opened and a load of paint dust sprayed in.

Masking the car is simple but do take care on awkward corners and crevices. Always use proper masking tape and brown paper. Newspaper is commonly used but is not recommended since the thinners can bleed out the printing ink, which might stain the new finish; colour supplements or magazines should never be used for the same reason. Mask anything left on the car with 1in masking tape right round the edge, followed by

well so the force of the spray will not blast through a join momentarily, covering the inside with paint. Upon removal of the tape, the door and boot seals will hide the edge. The preferred course is to mask up on the inside, peeling back the trim or removing it altogether. Then the whole edge can be painted and no change of colour will ever be detected.

Spend time on correct masking, as it has to withstand a great deal of force and no edges must lift.

## Flattening off

If the existing paint has microblisters (caused by moisture) then all the paint must be stripped off the body. If the original paint surface is sound it can be

'gloss' spots remain. Rubber blocks are ideal to assist in flattening flat surfaces. Wash thoroughly then go over the surfaces again with 600 wet-and-dry. Finally, when completely dry, go over the whole body with spirit wipe and a tack-rag, ensuring no sludge is left in crevices. If the body was masked before flattening, ensure corners are not lifting and the tape is still firmly attached to the fittings. The body is now ready for painting.

## Spray technique

It is essential to use the right technique to achieve a good finish. Both the air pressure (usually 45-60psi) and the paint viscosity must be correct. On paint information sheets and cans you will see



**Left, note wheel covers and double layer of polythene sheeting masking this Rolls-Royce Right, fitting up a painted engine bay before painting wings, reducing damage risk Below, flexible foam masking strip from 3M – ideal for awkward curves**



umpteen layers of paint.

When repainting on a perfectly sound original coat without the need for stripping, remove all the items that can be removed: headlamps; rear lamps; door handles; trim strips and badges; door and boot seals; bumpers. This takes only a few hours; nothing is worse than paint plastered over lights and seals due to laziness and poor masking.

If you remove everything, including window-frames and glass, so that in effect just the shell is left, then masking is confined to the open apertures. With the doors, bonnet and bootlid removed from the car, the door shuts, boot, and bon-

brown paper, or two sheets of newspaper, offered up to the tape and then stuck to it. Always tape any overlapping joins as paint drift gets everywhere. For large items, such as bumpers, use just strips of 2in-wide tape along the length. Door handles and small items should be masked carefully with tape only, paying particular attention to the body edge. Mask the radio aerial with a vertical strip, rather than wrapping a spiral of tape around it.

There are two alternatives for masking an open aperture. One is to stick a layer of tape about  $\frac{3}{8}$ in wide on the outside and affix paper to this, finally taping all joins

used as a base for a straight repaint after dewaxing with a spirit cleaner called solvent wipe. Then, using 320-grade wet-and-dry paper with warm water to which a few drops of washing up liquid has been added, start the laborious process of keying the surface well. This is not just a light skim over but a thorough flattening so no

# PAINTING

printed: '21-24sec on BS cup B4 at 20°C'. This means that a given amount of thinned paint will take between 21 and 24 seconds to pass through an aperture (British Standard viscosity B4) at room temperature. Not many people care about this and most just thin down cellulose to 50/50. However, if you want to do it correctly, a uniform paint specification will always be in the spray gun.

Stir the paint well, especially if it has been mixed and is not an off-the-shelf stock colour. Always try to buy in larger two-and-a-half or five-litre cans, rather than one-litre cans, as these may vary slightly in colour if they have been specially mixed.

Before you spray, experi-



**Left, masking an aerial with a vertical strip of masking tape**



**Right, paint gets everywhere so tape down paper joins well**



**Above left and above, in the absence of flexible masking strip, run one strip of tape round a corner and then tape masking sheet to it**

**Left, to prevent a paint edge when spraying a boot shut, the wing is left unmasked. The overspray is flattened off into the primer before the wing is painted**

**Below, for a partial panel respray over a repair, always mask along a car's natural lines**



ment first to get the spray pattern right. Pin a clean piece of paper to a wall and adjust the volume and air controls on the gun until a perfect spray pattern is achieved. When spraying, the gun should be held at right angles to the surface, six to nine inches away from it. The spraygun must be moved at a uniform speed and at a uniform distance. Never swing the gun in an arc, as the paint will then be

thicker in the middle than at the edges and the wrist must not flex. Overlap the previous pass by 50% to get uniform coverage.

Always spray the door shuts, bonnet lips, boot lips and underside of the bonnet and bootlid first. Do the 'exterior' of the car last, following the sequence given on page 21. Always allow sufficient time in between coat applications (flash-off time), otherwise a heavy

build up of wet paint will lead to all sorts of troubles.

Clean the spray gun thoroughly after use. It must be spotless, otherwise any hardened paint left inside will come out the next time you use it and ruin the new finish, especially if it is a different colour. All the jets must be absolutely clear otherwise an erratic spray pattern will result. Use cheaper thinners to clean out your equipment.

# BUILDING UP THE PAINT

*Avoid the temptation to rush when applying the paint*

**O**NCE the car is prepared, this is the sequence to follow when spraying cellulose. Spray on two or three coats of primer, either conventional or hi-build, following the sequence given on page 21. Allow the coats to flash-off properly – approximately 20 minutes at 16-21°C. When thoroughly dry, after a day, ‘de-nib’ with 600 grade wet-and-dry. ‘De-nibbing’ is a very light sanding to remove any high spots on the paint surface. After removing all traces of flattening-off dust, fill any blemishes with stopper or putty. Use two-pack stopper which doesn’t shrink. Flat-off and locally prime these areas again – never leave a broken surface – and ‘de-nib’. Before applying the colour coats go over the whole body with a tack-rag to remove any dust.

Now you are ready to start building up the colour, taking care to spray even coats. Usually eight passes over a given point are the minimum. To achieve a concours-winning finish, ‘de-nib’ after every four coats with 800-grade glasspaper until a total of 16 coats is reached. After the paint has been allowed to harden, the finishing can begin.

Spray fillers and two-pack paints are *not* suitable for use by the home painter, although isocyanate-free two-pack paint is available. Even so these must be applied in a spray booth/oven. When spraying



**Left, rust removal using a compressed air orbital sander. Sanding discs are attached by Velcro**



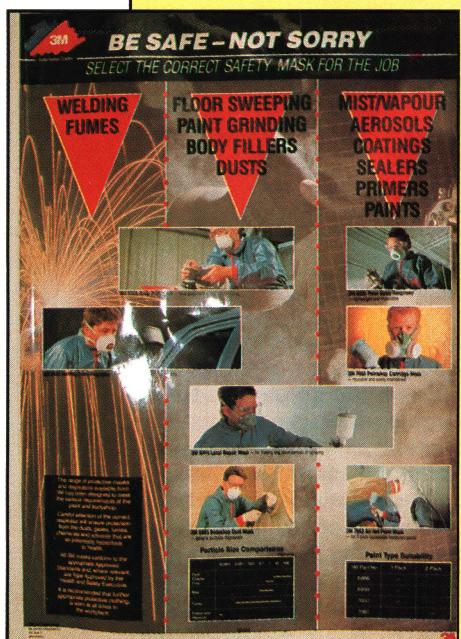
**Below, applying a coat of rust converter. Allow time both for drying and activation**

## HEALTH AND SAFETY

**Paint is both highly inflammable and poisonous, so take precautions**

**BE SAFE - NOT SORRY**  
SELECT THE CORRECT SAFETY MASK FOR THE JOB

WELDING FUMES  
FLOOR SWEEPING  
PAINT GRINDING  
BODY FILLERS  
DUSTS  
MIST/VAPOUR  
AEROSOLS  
COATINGS  
SEALERS  
PRIMERS  
PAINTS



**T**HE importance of looking after oneself while working with paint materials cannot be stressed too highly. Paints and thinners are highly volatile substances and can cause serious fires if exposed to naked flames. The flashpoints of most paints are between 32°C and 23°C but some have a flashpoint below 22°C. The following precautions must be observed:

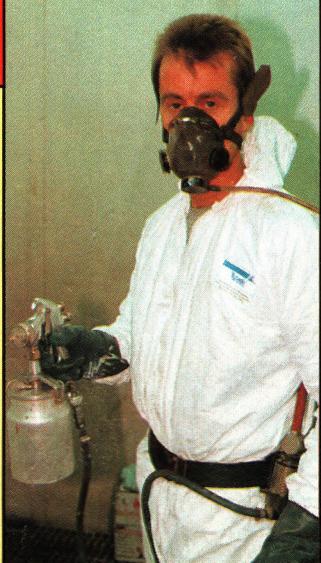
Buy a sufficient quantity for the job in hand, including resins if required, and store in a cool place away from excessive heat, such as direct sunlight. Failure to do this can result in heat build-up inside the cans, which will in turn vaporise the thinners content; the resultant pressure will blow the lid off. Apart from the awful mess which results, anyone stand-

ing near can get hurt. After use, always replace lids or caps firmly; dispose of empty cans safely.

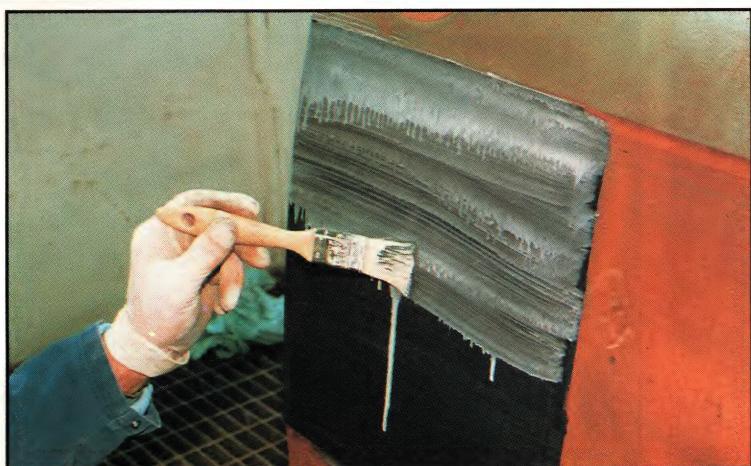
If any paint is left over, this can be kept for touch-up purposes. However, as with resins, there is a ‘shelf life’; after 12-18 months it should be thrown away. Paint will deteriorate, along with some thinners and hardeners, if kept for longer periods than this.

With all paints and thinners it is an offence to pour any residue down the drain; severe penalties can be expected if you are caught. All residues spilt must be soaked up in sand or earth and then buried.

Ensure good ventilation and air movement, as the vapour build up is tremendous; people with asthma or bronchial infections should not spray. Do not smoke and make sure there are no naked flames. Do not use open radiant fires or propane gas heaters in the painting area; if they are left on while



spraying, the flash point will be exceeded and devastation will result. Hire a proper space-heater, and achieve an overall warmth before spraying: spray, then heat again. Make sure that no electrical wires are live and dangling to cause a spark. If there are any electrical appliances that you do not require, take them out of the painting area. Wear rubber-soled boots or shoes. Always



**Above, applying the second coat of rust converter – brushing is sufficient**

**Left, working in using a wire brush**

**Right, repair dents after applying the converter. This is a small dent levelled with superfine filler**



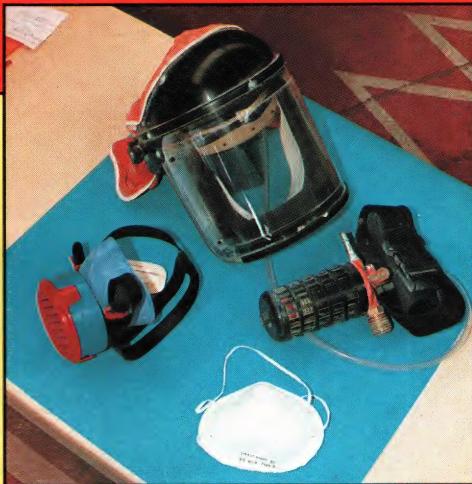
two-pack primers, or spray fillers followed by primers, don't forget to 'de-nib' afterwards. The colour is usually sprayed with the second coat applied straight on the first, wet on wet.

Base coat followed by clear lacquer is best applied in an oven; prime beforehand as above. The base colour is applied one on one, before the clear lacquer is built up gently and evenly.

With metallics take care to cover all the fleck with lacquer, especially with coarse finishes, otherwise when you 'de-nib' with 1,200 wet-and-dry you may break through the surface causing the aluminium flecks to oxidise and go dull. Take care to spray metallics in a constant direction so that the light will be reflected in one direction and the colour of the paint will not change when looked at from different angles.



**Left, full protective clothing with air-fed mask for the professional sprayer. Gloves are compulsory**



have a dry-powder or BCF fire extinguisher to hand.

When painting always wear a mask, preferably the type with a disposable air filter. Under no circumstances spray isocyanates without an external air source (a helmet with its own air supply). Leave the handling of two-pack paints to a professional paintshop. In this process cyanide vapour is produced and is lethal if breathed in for even a short period. The same applies to polyester spray fillers.

After painting, any rags

soaked in thinners or paint must be thrown away carefully, or burnt under supervision. If burning them, do not pile all the rags on at once and light – the resultant flashback may burn your arms and face severely.

Accidents do happen.

**Spillage:** Even when opening a new can cover it with a rag and prise off the lid gently, to release any pressure build up. If you have them, wear protective goggles. Mop up spillage with sand or earth and bury it.

**Fire:** If this is small, put it

out with an extinguisher (BCF or dry-powder type) or smother with sand. Do not use water as this will spread the fire; paints and thinners will float on the water. If you cannot contain the fire, then immediately telephone the fire brigade.

Think and plan before you spray at home, remembering that one tiny mistake could end in total disaster. The household insurance policy will refuse to pay on any claim, and the vehicle insurance company will not pay up either. There is also the chance of prosecution by the local council as paint spraying is usually strictly forbidden.

If any paint or thinners come into contact with your eyes, wash them under running water for at least ten minutes; if irritation persists, medical attention must be sought immediately.

Even if you wear a mask, if drowsiness or dizziness occurs because of over exposure to the paint vapour, get out

immediately into the fresh air and keep warm. Your health is more important than finishing the panel.

If you still feel unwell when returning to the job even with proper ventilation, then *do not continue*; you may well be allergic to the chemicals or smell. Let someone else or a professional finish the job. If you persist while feeling dizzy, you may find that eventually the high vapour saturation will starve the air of oxygen and you will become unconscious.

If any paint or thinners are swallowed, then drink copious amounts of water but *do not induce vomiting*. Medical attention must be sought immediately. If there is any spillage on the skin wash it off with soap and water, and use a cream, such as Nivea. Before starting use a barrier cream and rub in well.

Finally, always follow the instructions and warnings on all items. They are put there for your benefit.

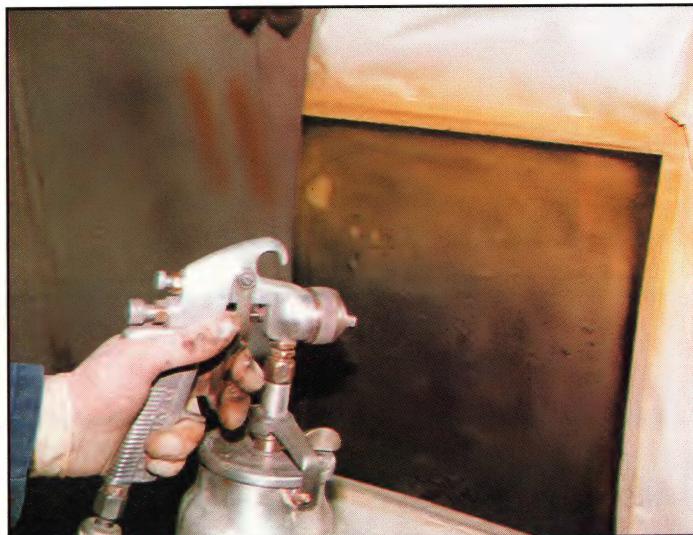
## BUILDING UP THE PAINT



**Above, sanding off filler using a rubber block and 80 grade paper. Note the use of different gloves to those used in spraying**



**Above, the gloves are another example of ever-stricter legislation. Here 320 grade paper is used to remove sanding scratches**



**Above, the painting proper begins at last, with two coats of chromate etch primer**



**Above right, the etch primer is followed by the first primer coat**

**Right, professional hand-held heat lamps for faster local drying speed turn-around time – they are not for home use**





Above, a gloss guide coat shows imperfections. The panel is then wet-flatted, washed and dried with compressed air



Above, any remaining pinholes or other imperfections are filled using a two-pack stopper



Above, the stopper is then – yes, you've guessed it – flattened off again using 320 grade wet-and-dry and plenty of water

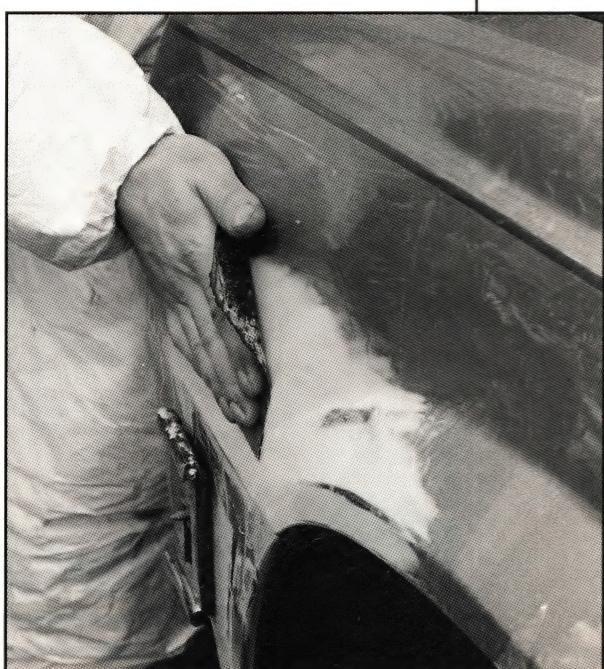


Above, the sanding slurry is then washed off again, and the panel is dried and then wiped with a tack rag



Above, a final coat of primer is sprayed to cover the stopper and any bare metal left after flattening

Right, awkward profiles must be flattened without the use of a block – be careful to flat evenly without rubbing the paint off peaks completely or creating ridges with the fingers



## BUILDING UP THE PAINT



Above, 'de-nibbing' – light sanding – the final primer coat with 800 grade wet-and-dry



Above, yes, the old routine again: thorough drying followed by a wipe with a tack rag



Above, at last we come to the colour coats, but don't go wild. Apply light coats and allow each to 'flash off' before the next



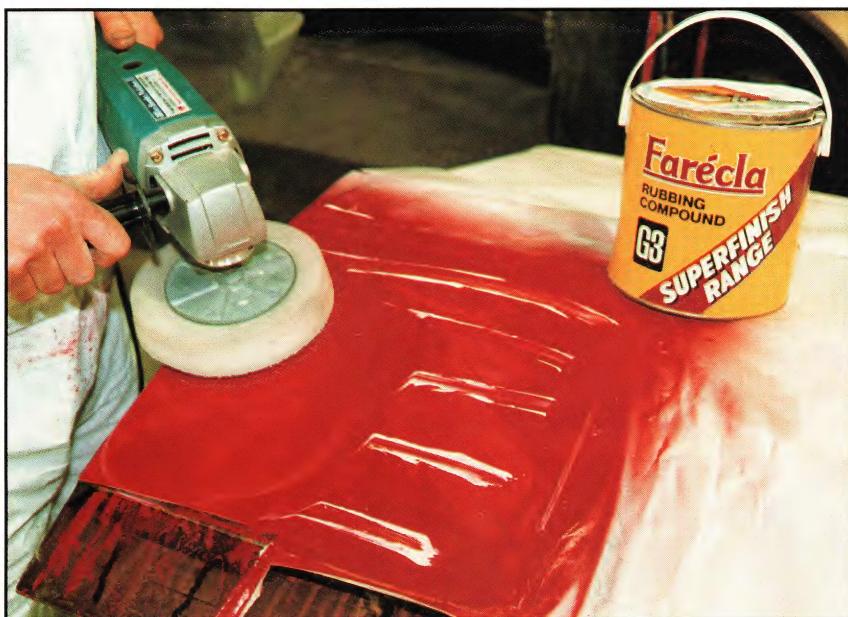
Above, when the paint is hardened (after a week or so for cellulose), the refinishing process for that high-gloss flat finish can begin. Soap and 1,200 grade wet-and-dry are carefully used to denib the surface



Above, use plenty of water and the flat of your hand with very light pressure



Above, this shows how the gloss from the gun becomes semi-matt after the 1,200 grade treatment



Above, using a fine rubbing compound and a mop to restore the brilliant lustre of the paint



Above, just keep this image in mind through all the rubbing down and painting: a quick polish before that concours win . . .



Above, the final process of hand-waxing creates the real depth of shine. Use a traditional rather than polymer wax



Above, resist the temptation to use a circular rubbing action when polishing off wax. Use straight strokes

# CASE STUDY: XJ6 COUPE

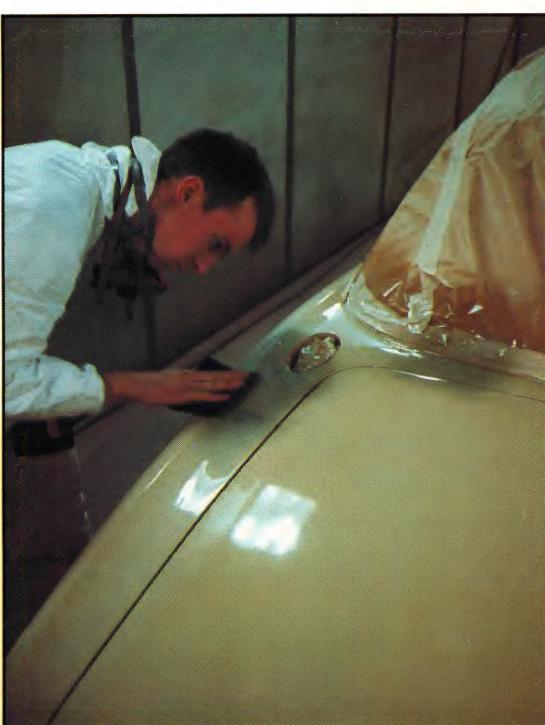
*An obscure paint reaction ruined this car's first respray*



**Left, a time-consuming and expensive respray on this XJ6 proved to be wasted effort when the paint blistered, due to strange paint reaction. Here the blisters are being picked off  
Above, the paint had to be stripped off and the job done again - a lot of heartache and expense**



**Above and above right, having applied the primer coat, high spots have been rubbed back**

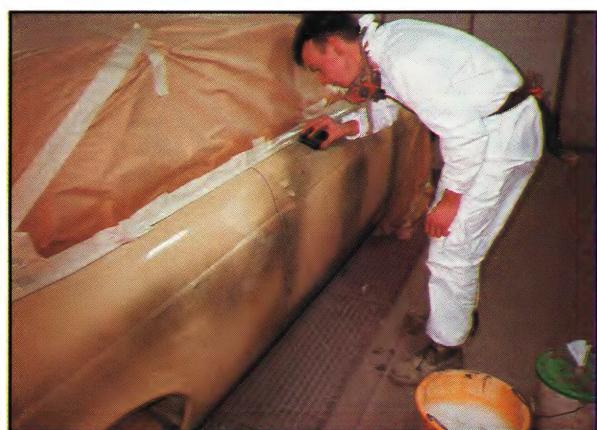
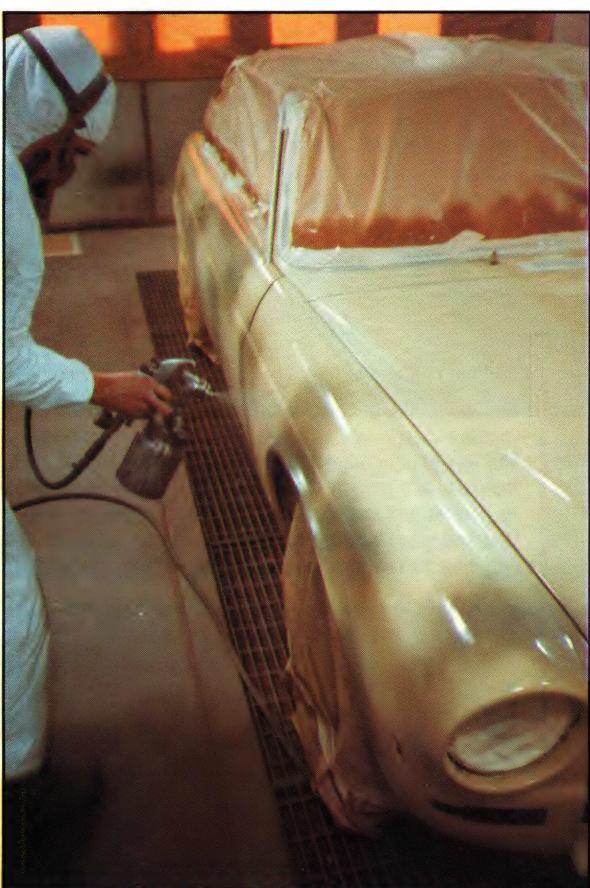


**Left and above, guide gloss coats over high spots being rubbed back**

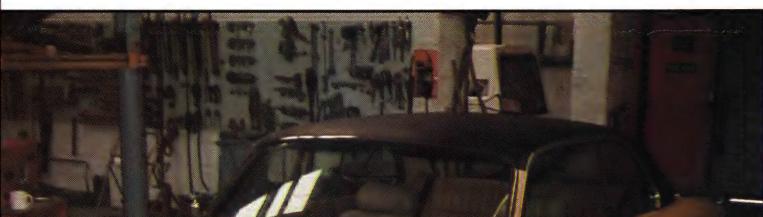


**Left, back to bare metal.** On the initial respray, apparently sound original paint had simply been deglossed before the new paint was applied, but the new and old paints reacted

**Left, the paint is stripped right back (again) prior to applying more coats of primer  
Below, one low spot is filled and flattened after the first coat of primer has been applied**



**Far left, here a guide coat is being applied. This is usually black gloss, which shows up uneven surfaces better than matt primer  
Left, the light guide coat need only be applied where there is any doubt about the surface  
Above, where the guide coat reveals high spots, these are rubbed down immediately**



**Left, the top coats of two-pack isocyanate applied in the oven, the Jaguar then receives a lacquer coat**

**Right, components and new vinyl roof refitted on the finished car**



# PAINTING OTHER SURFACES

## GRP

**P**AINTING GRP (glass-fibre) is not the same as painting metal; this is the first and most important lesson to learn. It takes far longer to achieve a perfect finish and any mistakes will show up instantly.

GRP is a soft material, as opposed to metal which is hard; this immediately gives problems when repairs have to be made. After the repair is finished and the painting has begun, the thinners can sink into the glassfibre layer and actually lift the repair edge up – forming a sink mark around the repair – or the thinners can be absorbed into any exposed mat capillaries, to give problems later on. With metal, once the thinners hit the hard surface they cannot be absorbed.

It is essential to spend far more time over the repairs in the first place; final preparation must be thorough on GRP. Deep score marks, from a rasp file or P40 or P80 production paper, cannot be left as they will show immediately the paint is applied. This is because the thinners carry the paint into the mark and keep on going. The more paint that is applied, the worse it becomes. All score marks must be removed on GRP, going

down to 220 wet-and-dry paper to achieve a perfect repair/paint edge when using spray filler, down to 320 and 600 paper when using hi-build primers.

The whole painting process also takes longer. Allow a minimum of four weeks turn-around for a full repaint. The paint must be left to stand, so as to allow any thinner/paint interaction to take place. If you smother the body in primers and colour in a one-week or two-week period the result will no doubt look superb for precisely a month, then all the repairs will show through one by one as the high concentration of thinners is revealed. If you are using a synthetic paint, the

**Right, an original Lotus Elite shell being dry-sanded after spraying with polyester spray filler and a guide coat**  
**Below, a local repair has been brushed in on this Lotus Elan wheelarch. After flattening off, the whole front end will be primed**  
**Below right, polyester spray filler (with hardener) should not be confused with high-build primer**



plastic film will creep into the repair and follow every blemish.

The painting technique applied to all cellulose sys-

tems, for both primer and colour, is confined to literally dusting it on and building it up 'dry'. That means keeping the thinners content to a

minimum 35/65 or 40/60 instead of 50/50. Do not just flood it on but obviously make sure it is not so dry that the paint is too thick or



## WOOD

**W**OODYEN frames and steering wheels can be refurbished to be as good as new. With wooden frames, if there is any rot then obviously replace the section. If all the wood is sound, remove all traces of old varnish by sanding it off or using paint stripper, finishing with a light sandpapering. Either way leave the surface thoroughly clean and dry with no dust. Preserve with clear Cuprinol and when this is thoroughly soaked in and dry, brush or spray a thinned (20/80) coat of varnish, followed by a 50/50 coat. When dry apply a coat of varnish,



'de-nib' with glasspaper and then do two or three more coats; 'de-nib' before the final coat. Varnish can be sprayed as well as brushed. Preferably use the non-polyurethane varnishes;

polyurethane ones don't breath and if moisture gets trapped milky patches will appear. Some people prefer Danish Oils to varnish or Ronseal-type varnishes, building up to six to eight

# ALUMINIUM



Finally leave well alone for weeks before flattening with 1,200-grade glasspaper and soap and then compounding. All thinners content must be evaporated evenly and quickly so uniform heat is essential. If after many months slight shrinkage occurs, then depending on the amount of paint, blocking off with 1,200 and soap will flatten it away.

Air-drying synthetics, useful for kit cars, take 12 to 16 hours to cure and will follow every blemish and cover it with a plastic film. This film cannot be blocked off. Two or three colour coats are normally sprayed.

The most suitable systems for GRP are two-pack primers and colours. Two-pack primers now take the place of spray fillers and, because they cure chemically in a short space of time and the thinners content is kept to a minimum (unlike 50/50 cellulose), shrinkage is drastically reduced. The surface is 'de-nibbed' with 600-grade paper almost immediately and then colour can be applied; all this is done in an oven at around 35°C. GRP bodies should always be painted in an oven to ensure an overall heat but never bake a GRP body because at 60°C it will start to deform. An oven temperature of around 32-38°C is known as a force dry.

atomises before it hits the surface in bubbles. Spray two or three coats of primer and allow to stand for some days or even a week or so. If after that the repairs start to show, flattening off will not provide a solution; the repair will have to be done again properly. If all appears sound, flat the surface well with 600 wet-and-dry followed by a wipe with a tack rag. Make sure the primed surface is thoroughly spotless and dry before you start building up the colour coats. Just dust the paint on with anything up to 16 passes ('coats') over one spot.



**Far left and above left, this Morris Minor Traveller's woodwork must be replaced – it is structural**

**Above, varnish is thinned to improve penetration**

coats. Steering wheels are treated in the same way: remove the old varnish, apply one thinned coat, followed by four more coats, 'de-nibbing' before the last with glasspaper.

**T**HIS is a soft metal and must be treated with respect, almost in the same way as GRP. Repairs to aluminium should be finished off with a fine wet-and-dry grade of paper, say 240 to 320, to remove any deep scratches left by sanding off filler quickly or grinding off file marks left after smoothing newly-applied aluminium weld. Heavy sanding pressure may leave dents in the panel, while excessive heat when welding may stretch and distort the panel. Unless you have experience of repairing aluminium this is best left to a professional.

Paint can be stripped off in the same way as for steel: using paint strippers; by hand with wet-and-dry; with compressed-air sanding tools. Any raw aluminium that has been left out and has weathered with the familiar white-powder surface (aluminium hydroxide) must be flattened to a shiny surface using 320-grade wet-and-dry.

Preparation for painting is to flat the surface well using 320 wet-and-dry and then prime in the same way as for

painting on top of existing paint. New or bare aluminium must be treated with two coats of an etch primer, be 'de-nibbed' and then have two further coats of conventional primer applied and 'de-nibbed'. This is followed by the colour coats. Alloy bodies are never baked in an oven since the rate of heat expansion is far greater than that of steel and could crack the paint surface. Treat as for GRP, with a force dry at up to 40°C, allowing gradual and gentle cooling down.



**Above, etch primer for aluminium  
Below, Ace awaits etch coat**

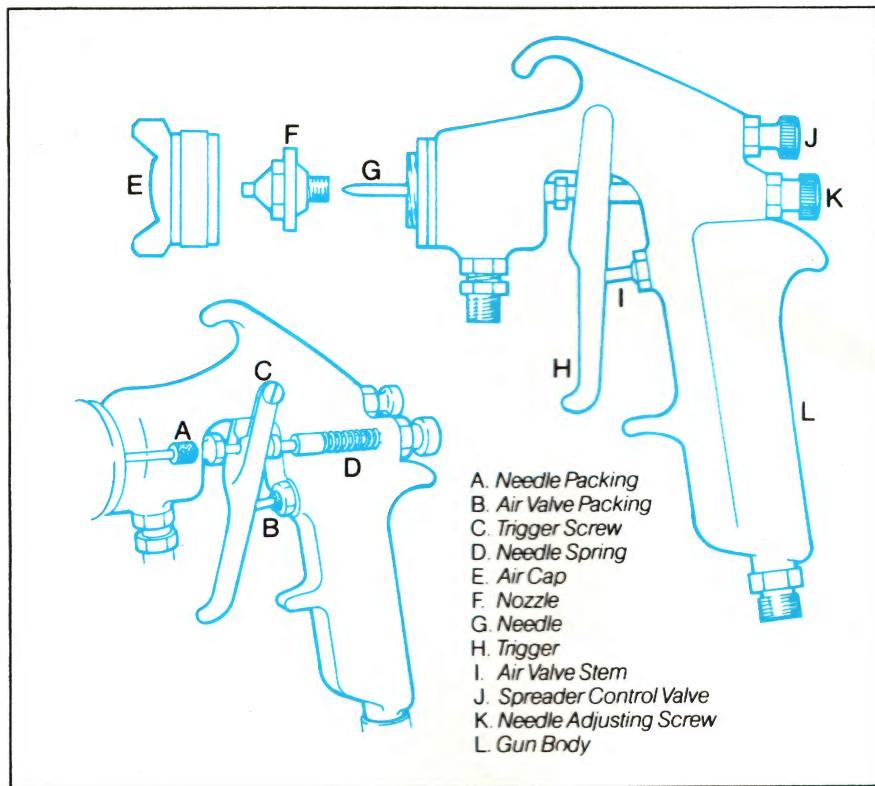
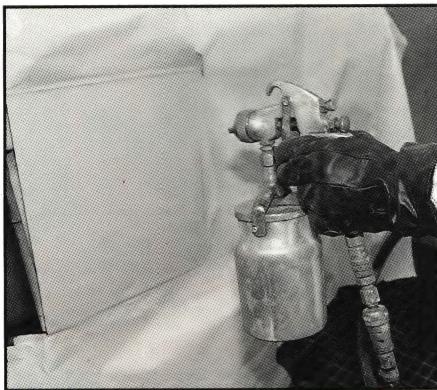


## FABRIC

This is not really applicable to Sixties and Seventies Classic cars, apart from Webasto-type sunroofs. If the appearance is awful then replace the fabric; if not use specialist sprays for this. Do

not spray cellulose on fabric because the thinners will attack it, hardening it and eventually rotting it away. Likewise never spray vinyl roofs; peel the vinyl off and replace with new.

# SPRAYING TECHNIQUES



**Above, always hold the spraygun at right-angles to the panel**  
**Right, do not angle the gun up or down, nor bend the wrist, otherwise paint will not be applied evenly**



## DO IT RIGHT

Spray gun held too close may lead to:

- Orange peel
- Runs and Sags
- Striping of Metallics

Spray gun held too far away may lead to:

- Orange peel
- Dry spray

### Incorrect gun set-up:

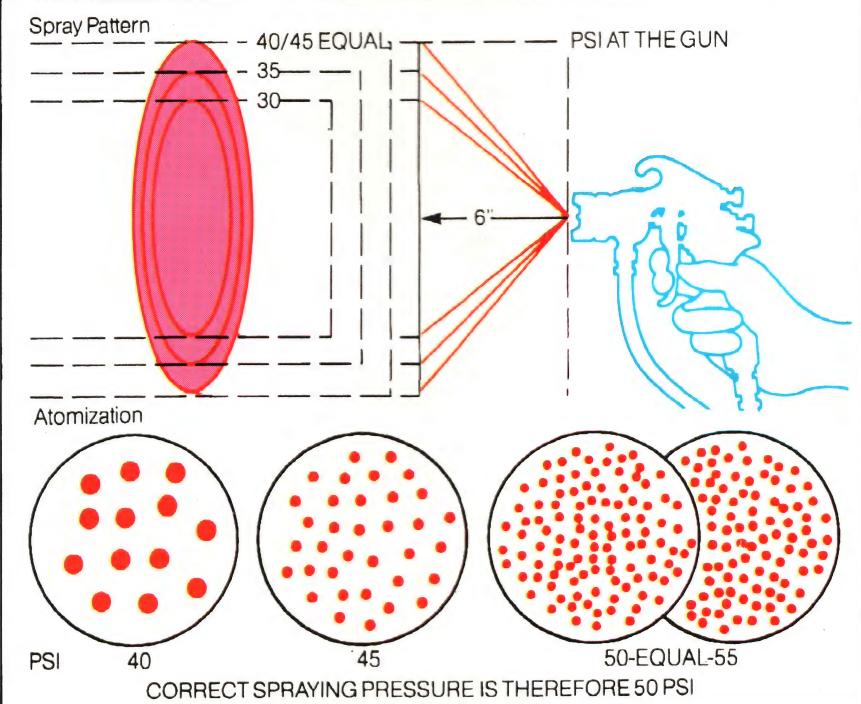
Large fluid nozzle with low capacity air cap will give runs and sags.

Small fluid nozzle with high capacity air cap will give dry spray.

### Incorrect Spraying Technique:

Fan width too narrow — striping of metallics.

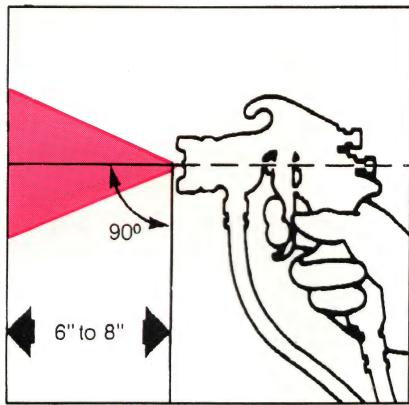
Gun not held at right angles to the work surface — striping of metallics.



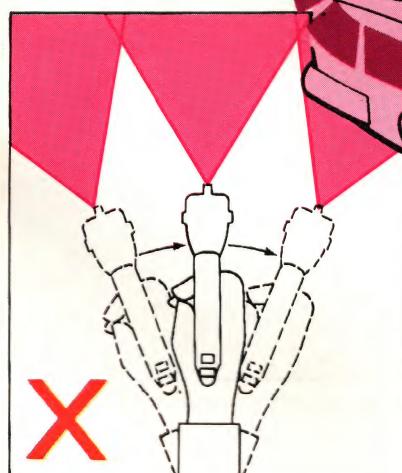
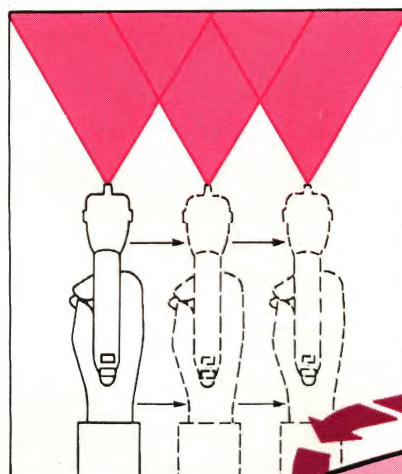
## Triggering

The gun should be in motion before the trigger is pulled; and the trigger released again before the gun movement ceases. This technique gives a 'fade in' and 'fade out' effect, which prevents overloading where one series of strokes is joined to the next by overlapping the stroke ends.

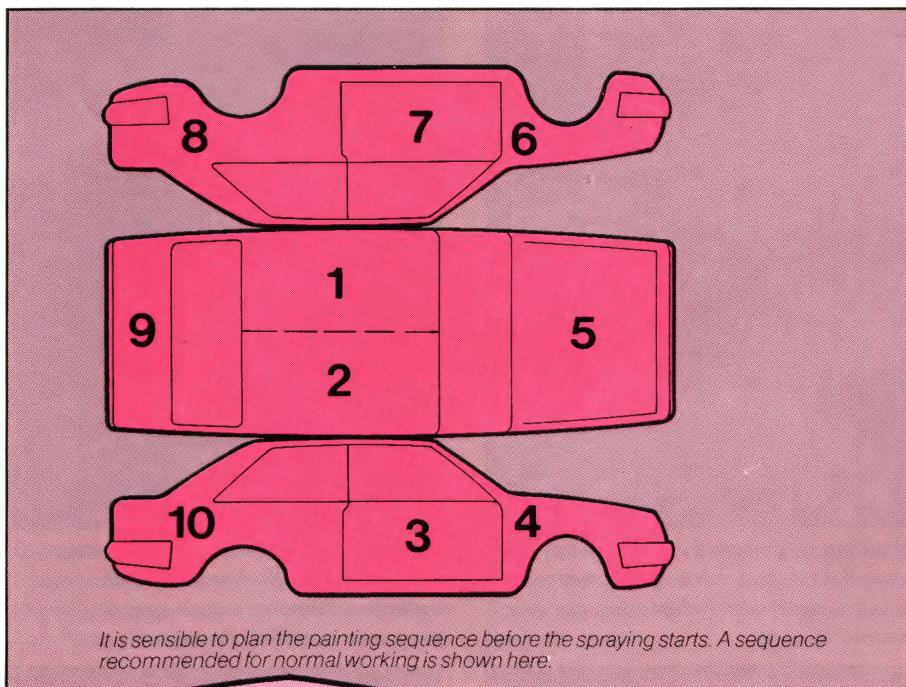
Triggering also helps to keep the sprayhead clean, and to minimise fatigue.



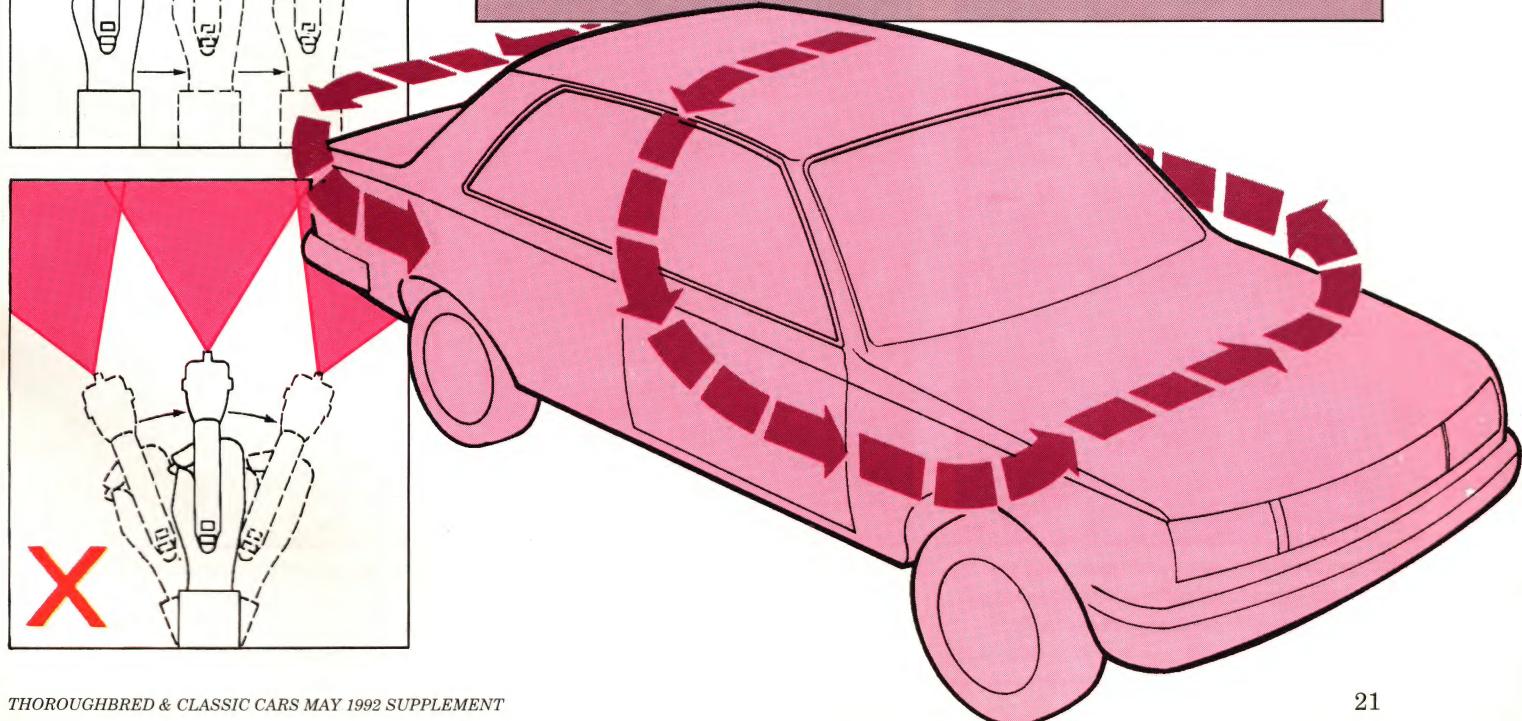
The spray gun is held at right angles to the work surface, and moved at a uniform speed and a uniform distance from the surface. It should never be swung in an arc from the wrist or elbow – except when carrying out fade out repairs (see section on local repair techniques).



Left, the span of the hand is an easy guide to correct gun-to-panel distance  
Below, sequence for painting panels



It is sensible to plan the painting sequence before the spraying starts. A sequence recommended for normal working is shown here.



# WHAT GOES WRONG

*Defects can show themselves both during and after painting*

**A** FEW professional tips may help you avoid disasters when spraying. If the air pressure is too high then an 'orange peel' finish will result, usually with a loss of gloss. Too low a pressure will cause paint runs and pinholing with too heavy a build up of paint. Hold the gun six to nine inches away from the surface, otherwise the effect will be

the same as above. With metallics striping will occur (dark and light stripes) if the fan pattern is not correct and the gun is not held at right angles to the surface. Shake the paint in the gun regularly.

**Dirt** is the major cause of contamination; everything must be spotless including the floor and equipment. If foreign matter is trapped on the surface then when it is

dry a light flat with 1,200 wet-and-dry and soap will do the trick; if the dirt is deeper, the panel will have to be done again.

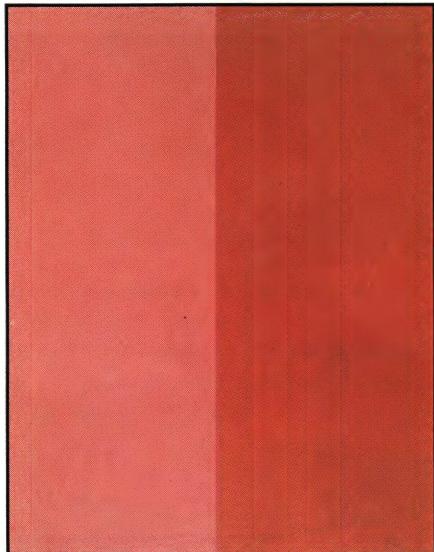
**Runs, dribbles and sags** result from too much paint being applied to a given area. Make sure that the spraying technique is correct, observe flash-off times between coats and ensure good overall warmth. With cellulose, flat-off with 1,200 wet-and-dry and soap and then polish. With synthetics you may be able to flat it out when completely dry, if not

re-do the panel.

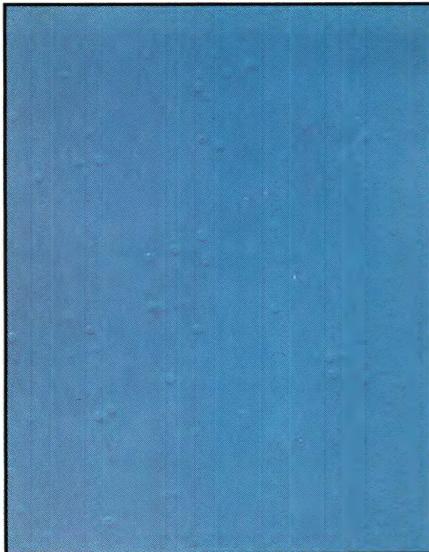
**Bubbles** result from air trapped under the paint because of poor repairs, such as air bubbles left in filler. In hot weather the air expands. The only recourse is to strip back the paint to the repair underneath and re-do.

**Bleeding** occurs when old pigment bleeds into the new 'thinners' of the paint layer. Old paint has to be sealed first with an inhibitor sealer or, better still, stripped.

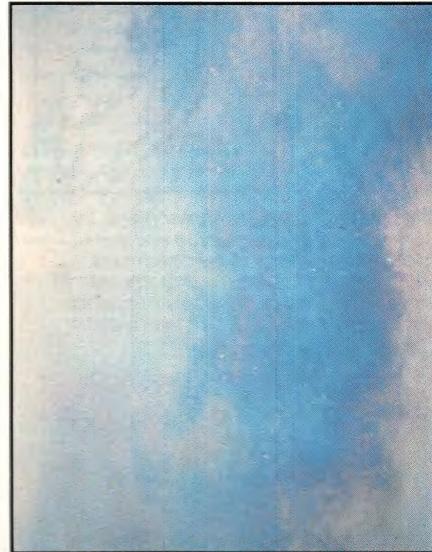
**Blushing** is where the surface goes milky, caused by



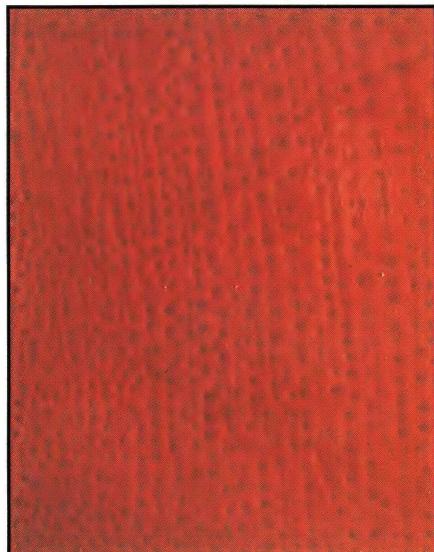
**Bleeding:** pigments from old paint (usually red, maroon or yellow) dissolve into the new paint (white above), discolouring it



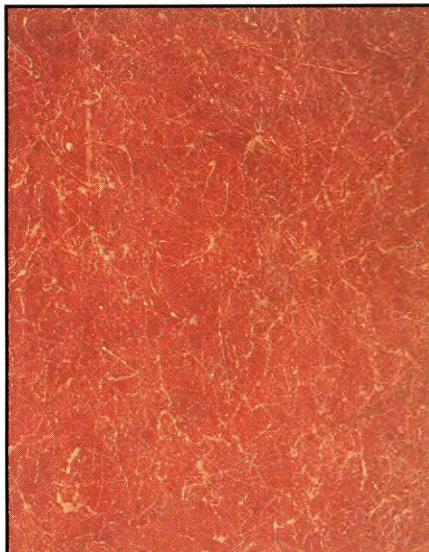
**Blowing:** trapped air – in hastily applied or unstopped filler, unsealed seams or unfeathered paint edges – expands in the oven, bubbling the paint



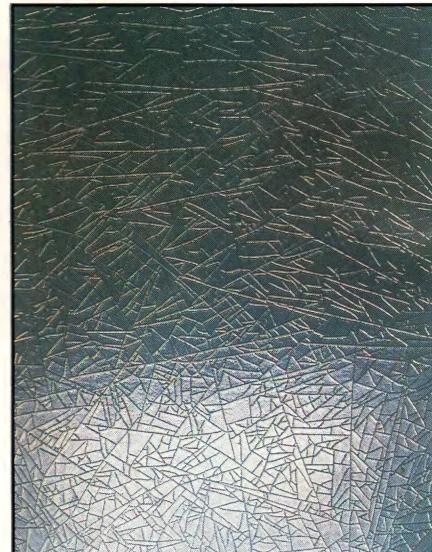
**Blushing:** milky dulling of lacquer finishes, mainly in humid or damp conditions or due to use of a poor-quality thinner



**Cissing:** cratering or fish-eyes due to paint contamination by waxes, greases, detergents or metal pre-treatments



**Cobwebbing:** paint does not atomise due to being too thick or cold, or due to incorrect air pressure at the nozzle



**Crazing:** caused by incompatible paints; lacquers stored at too-high temperatures; or painting enamel on a first coat that has partly cured



damp conditions. If the blushing is slight, a good compounding and polish will restore the gloss. Otherwise flat-off with 600 grade wet-and-dry and

repaint, ensuring good overall warmth and ventilation.

**Craters or fish-eyes** are literally saucer-shaped marks in the surface due to contamination by waxes, sili-

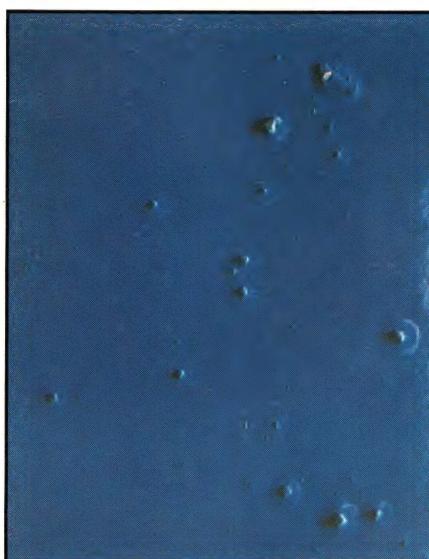
cones, soaps or Waxoyl. Remove these, flat back to a solid base and repaint.

**Cobwebbing and dry spray** is where the paint fails to atomise or is in a powdery state as it hits the surface due to poor spraying technique; the pressure and viscosity must be correct. If this is slight, flat with 1,200 wet-and-dry after hardening and polish; if not then flat off with 600 grade and repaint.

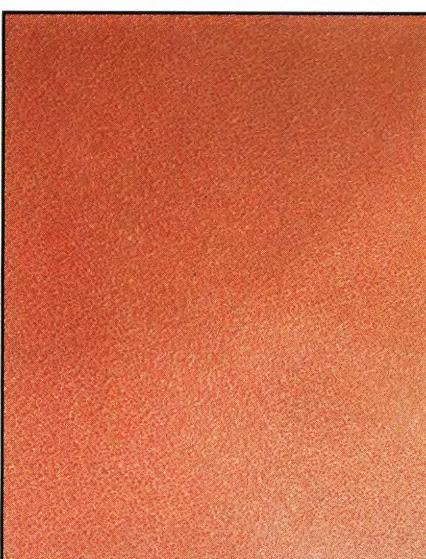
**Cracking and crazing** are paint reactions. Always repaint using the same system throughout, ie cellulose

on cellulose. A synthetic/cellulose sandwich will react and craze. Piling on new clear lacquer over original lacquer/metallic finishes will eventually cause crazing. If the paint just cracks or splits away, the cause is simply too many resprays. The only answer is to strip the paint back to the bare shell and start again. On GRP cars painting over cracks in the gel coat gives the same effect, with the paint splitting away.

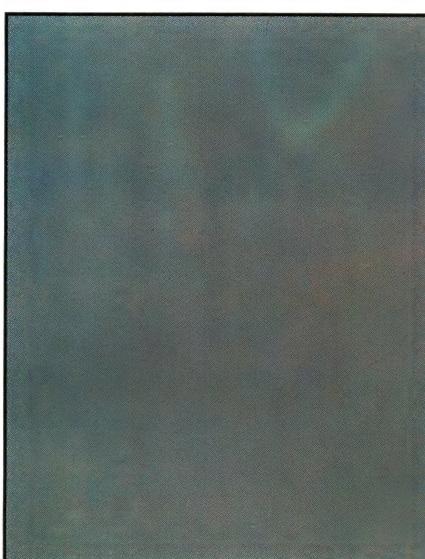
**Pinholing and popping** are bubbles with a pinhole in



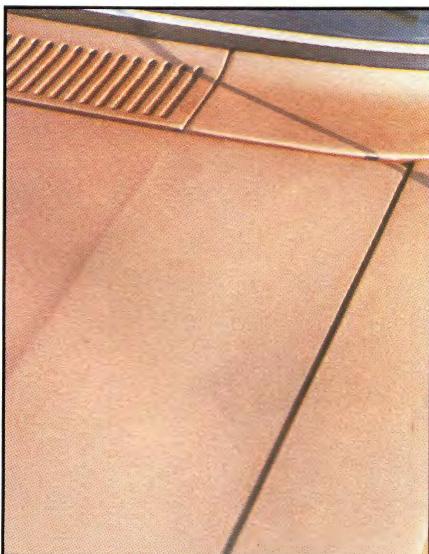
**Dirt:** from an unfiltered air supply, accumulated overspray dust or dirt blown out of seams and crevices on the car body



**Dry spray:** spraygun held too far from the panel, paint too thick, wrong thinner, wrong nozzle or conditions too hot. Flat-off/respray



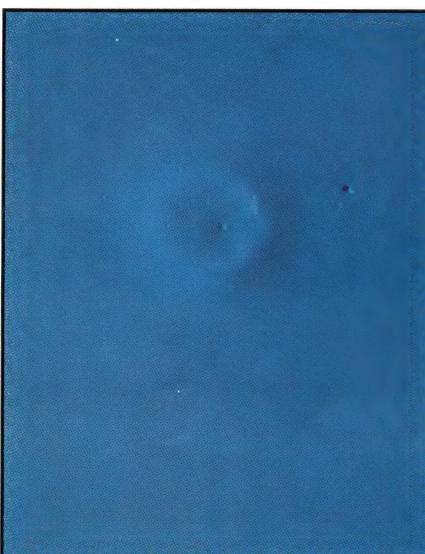
**Floating/flooding:** non-uniform/uniform colour changes due to application of heavy wet paint film or re-brushing of part-dry paint



**Low gloss:** from low-quality thinners, paint or undercoat, painting in foul conditions or wrong pressure/viscosity. May also be old age



**Orange peel:** wrong air pressure, viscosity or thinners, panel surface temperature too high: or it may be deliberate!



**Pin-holing:** caused by painting over a dry-sprayed undercoat; trapped air bubbles; or where a thick lacquer coat skin-dries

## WHAT GOES WRONG

them on the surface. This fault is caused by the paint surface drying too rapidly and trapping air underneath. Spray conditions and technique are to blame; rectify by flattening-off with 600 grade wet-and-dry and then repaint.

**Poor bonding/adhesion** is usually revealed when the masking tape is removed and the paint comes off as well. The primer layer must be well keyed and free from contamination to accept the colour, especially with two-pack paint. If left for weeks after application, the primer

must be thoroughly flattened off otherwise the new colour will literally peel off. Always use one manufacturer's products throughout.

'Orange peel' is caused by air pressure that is too high, with consequently too much paint applied. Rectification is time consuming and involves flattening the surface very carefully with 1,200-grade wet-and-dry paper and soap (see Finishing on page 28).

**Lined or scratched surfaces** are caused by use of the wrong flattening grades; heavy score marks are not correctly removed. Most can be flattened out with 1,200 wet-and-dry glasspaper and soap, followed by a polish. If the marks are severe then flatten-off with 600-grade wet-

and-dry and repaint.

**Sinkage** is where paint dries showing the outline of the edges of all repairs and other defects. Sinkage can go on for up to six months with cellulose and synthetics. When finally hard or cured, a light flat with 1,200 wet-and-dry and soap and then a polish should erase it. If not, then the repairs will have to be done again correctly (especially on GRP cars) and repainted. Sinkage occurs with a repair area butting up to, say, five or six earlier repaints; the only answer is to strip the car or panel back to its bare state.

**Wrinkling, puckering and shrivelling** are caused by too many colour coats or trying to dry in too cold or too humid an atmosphere with a

high air movement, so that the top surface dries leaving wet paint underneath. Placing the newly-painted wet surface in a foul atmosphere (petrol vapour or exhaust fumes) will cause wrinkling as well. Dry thoroughly, flat back to a sound base and repaint in the correct conditions.

**Microblisters and blistering** are the effect of moisture permeating through the paint film and causing loss of adhesion between layers. Cellulose is more prone to this than any other system; high- and low-bake enamels are water resistant as is two-pack, but synthetics are vulnerable while they are curing. Microblisters will occur on cellulose eventually anyway, usually after ten



**Poor adhesion:** from contamination of the surface prior to painting; incorrect use of primer or incompatible paint systems



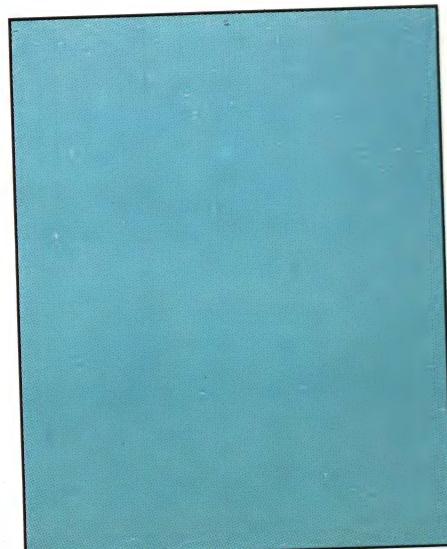
**Poor opacity:** the paint is low-quality, over-thinned, not stirred properly or too few coats have been applied



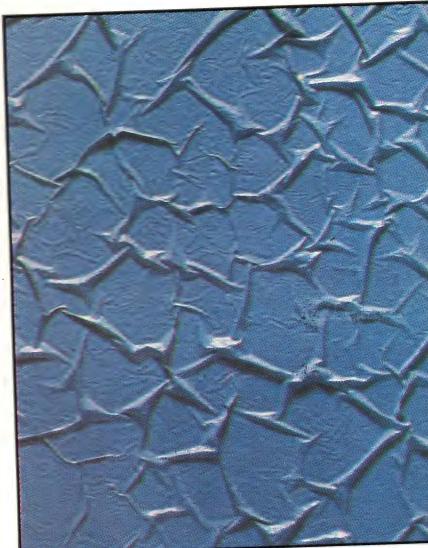
**Popping:** hot, dry conditions; excessive air movement; insufficient flash-off time; heat source applied too soon or too close



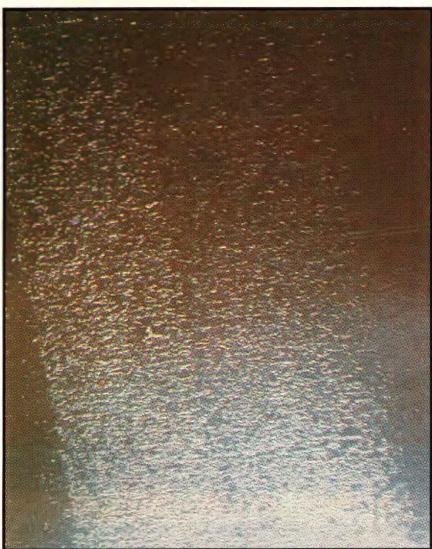
**Runs/sags:** usually from spraygun being held too close or moved too slowly, or paint coats not left to flash-off



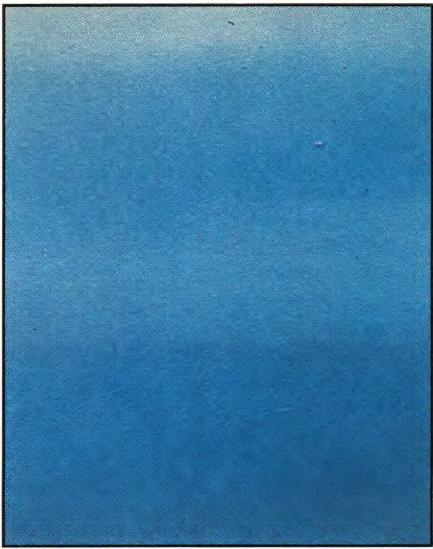
**Sinkage:** paint sinks into or swells over too-coarse sanding marks. Undercoat too heavy or drying insufficient



**Shrivel:** foul atmosphere or poor conditions causing paint surface to dry too fast with wet paint underneath; or paint too thick



**Slow drying:** paint remains soft due to surface drying as for shrivel, or there may be surface contamination by wax



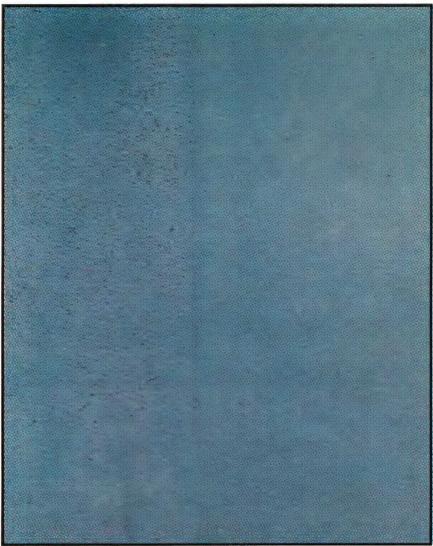
**Striping (of metallics):** bad technique; spray strokes should be overlapped by at least 50%, or 67% for the final coat



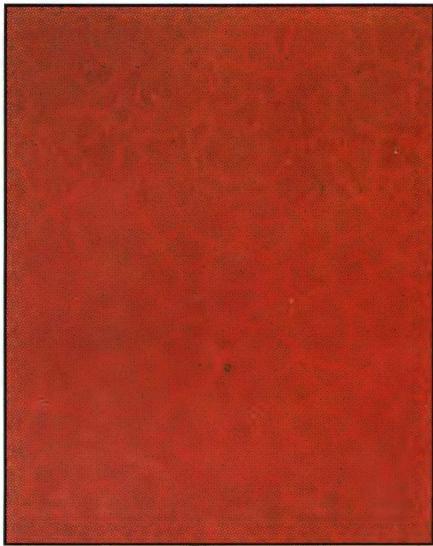
**Blistering:** exposure to moisture before paint is hardened; incompatible paints; contamination; or old age!



**Bronzing (on blues, maroons, blacks):** sometimes unavoidable; otherwise poor paint mixing. Polish or wet-flat



**Chalking:** powdering due to old age and repeated exposure to sunlight and moisture. Polish or compound if severe



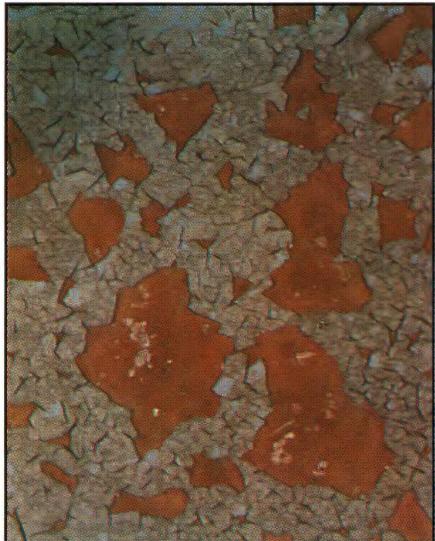
**Crazing:** mainly in lacquer coats; fast temp changes can stress colour or overall paint films that are too thick



**Colour change:** modern paints are very lightfast; acid rain and traffic fumes (and paint mix!) can affect colours. Polishing may cure



**Cracking:** due to uncorrected defects below the colour coat: stripping paint to bare metal is the only fix



**Flaking:** existing faults cause bad adhesion. Strip off paint, clean metal with phosphoric acid and repaint

# SMALL JOBS

## PART REPAIR

A PART or 'spot' repair is really only a scaled-down repaint. After any repairs, dents or scratches have been dealt with, the surrounding area is dewaxed using spirit wipe and then flattened off using 320 wet-and-dry. With cellul-

lose the surrounding area can be kept to a minimum since the paint will blend in to the original finish. With synthetics and two-packs the surrounding area may have to be the whole panel. The aim is to lose the edge of the respray on the smallest line possible as it is virtually impossible to blend in the new paint. With base coat and clear, the colour



Above, a bodged filler repair falls off rusty metal  
Left, headlights and trim strip are fitted up to repaired MGB wing before the top coat is applied  
Below, flattening primer into the existing colour coat



## WHAT GOES WRONG

years if cared for properly, or less if not. Some primers and spray fillers are notorious for holding water, so

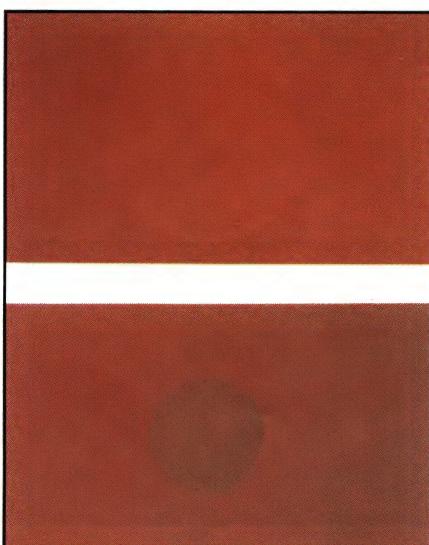
when spraying everything must be bone dry. If blistering is from old age, then a repaint is overdue. If the problem occurs on a new surface then flat back to a sound base; if the first primer/spray filler layer blisters, then strip back to a bare shell and start again – other-

wise the blisters will only reappear.

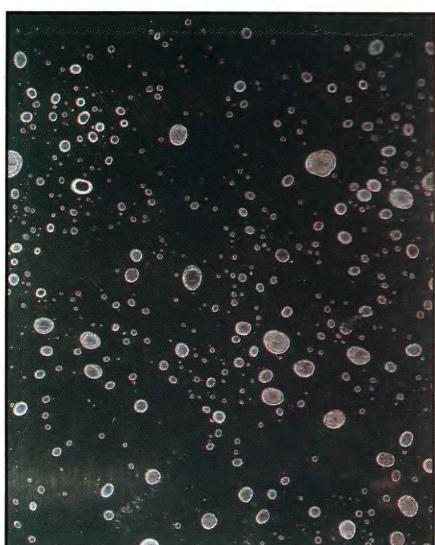
**Bronzing, chalking and colour separation** are defects of old age where the colour literally separates into its constituent pigments. Bronzing is mainly on blues, black and maroon where the colour looks dif-

ferent, whilst chalking shows up as a powdery surface. In all cases, a repaint is long overdue.

**Poor covering (opacity)** results from bad technique: the paint is too thin and there has not been enough build up of coats. If the loss of gloss is slight, then a light compound and polish should restore it. If not, you will need to flat back to a sound base with 600 or 800 wet-and-dry and repaint.



Industrial fall-out: air pollutants can stain the paint; compound or clean with (toxic) oxalic acid in bad cases



Water marking: caused by evaporation of water droplets. Use white spirit to remove any old wax and then polish

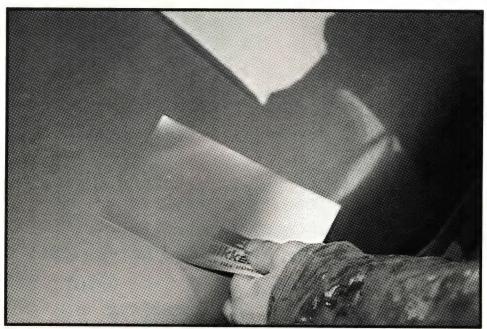
## AEROSOLS

area is kept to a minimum and the lacquer is then blended in over a large area to marry into the original lacquer. Cellulose must not be sprayed on synthetics but can be applied on two-pack (not the other way round).

It is imperative that all repair edges are feathered away to perfection so that no wet-and-dry glasspaper marks can be seen, especial-

ly if coarse papers or files have been used. Use 600 wet-and-dry finally, then spirit wipe and mask up as required. Spray two or three light coats of primer, 'de-nib' with 600-grade wet-and-dry and dry thoroughly. Go over the area with a tack rag before the colour coats. With cellulose wait a few days, then compound and polish to achieve a high gloss.

**Left, testing the gun spray pattern and paint mixture**



**Right, this part repair has been primed with two-pack brush-applied primer, here being flattened off**



## HAND-PAINTING

In the true sense, this is a dying art as spraying is so much quicker. Some professionally hand-painted Twenties and Thirties cars have a better finish than modern orange-peel surfaces but of course the time taken is endless. Brushing cellulose is used and each coat is built up evenly in a controlled atmosphere with a constant temperature. After two or three coats it is 'de-nibbed' and a further two or three coats applied. The process is repeated until the final coat is put on, left and finally burnished to give a high gloss. Modern hand-painting is not satisfactory and really should be confined to non-important areas that aren't on show. The finish cannot be as good as that achieved by spraying and the time involved is immense.

ANY people achieve amazing results with aerosol cans but they are really only useful for touch-ups or for tidying up engine bays and wheels. To paint a whole car using aerosol cans is of course an incredibly expensive way of doing it. There is also the problem of the hundreds of empty cans which have to be disposed of safely afterwards. Aerosol cans use a propellant gas to force the paint out under pressure, and are all cellulose-based with a high thinners content. There is no such thing as a two-pack aerosol yet as no one has found a way of propelling hardener and paint at the same time in a perfect mix.

When using aerosols it is essential to prepare the surface exceptionally well, since the high thinners content will sink into hard edges or poor repairs giving rise to an unsatisfactory result. Preparation therefore is as for spraying cellulose (see page 8) but all panels should be finished further with 600-grade wet-and-dry to achieve a perfectly fine overall finish on the repair area or panels. Ideally no coarse 80/120-grade 'grit' lines should be left because they will always remain and will show up later. Aerosol primers are not as good as modern two-pack hi-build primers in their covering/build-up properties, although there are some hi-build spray putty/primer coming on to the market.

Before you start, make sure the aerosol is compatible with your paint surface; if not the thinners will attack it and cause bubbling as it reacts. Make sure marking up is done well and the panel is completely clean and free from dust and grease. Always spray at room temperature (20°C); too cold and blooming will occur (especially on satin and matt blacks), too hot and the paint dries before it hits the panel. Always shake the can well to start with for two to three minutes to get an even distribution of paint in the thinners (especially with metallics); shake regularly while spraying as well.

Follow this sequence: Apply two or three coats of primer to the area, holding the can 12in away and building up gently. Do not flood the primer on as the surface dries quickly leaving the rest still wet, and runs will occur. Let it dry thoroughly. The two most common faults with aerosols are ladelling it on and never allowing enough time for the paint to dry. Dry off and then build up slowly with colour coats, spraying light mists in anything up to 12 or so passes. When dry (after 24 hours), 'de-nib' with 1,200 and soap, dry off, and spray the lacquer coats if required. Finally wait a week and cut back using a light compound, or even just T-cut, and then wax. Aerosols are extremely useful and excellent results can be achieved if the correct amount of time is taken.

**Below, off-the-shelf products for various applications**



# FINISHING

*It's two steps forward and one back for the perfect paint finish*

ONCE the body is finally painted you are ready for the final finishing operations. The first decision is whether you require a flat finish or one with a slight degree of 'orange peel', depending on the manufacturer's original finish or your choice. Most Classics usually had a flat finish and the quality of your spraying will dictate the amount of work required to achieve this. You need a good paint depth. To produce that concours-winning flat-finish mirror gloss, the procedure is to flat the surface very carefully, ensuring that you do not go through on the edges, using 1,200 wet-and-dry with soap. This process is used for lacquers as well as metallics. If the 'orange peel' is bad then a great deal of time will be required. When all the surfaces have been done, wash thoroughly and dry off.

The next stage is to compound the surface with a mop. Compound is sand suspended in an ammonia solution and varies in grade from one (ultra fine) to seven (coarse). The mop is a lambswool pad retained on a disc rotating at speed. In the wrong hands all the body edges will be stripped of paint, so go over the surface gently in even sweeps, using the full face of the pad; slowly the surface will acquire a shine. It takes at least a day to compound a

car but the results are always worth it. The surfaces can be compounded by hand but that takes even longer and it is essential to use even hand pressure otherwise unsightly lines may appear.

With air- and oven-drying synthetic paints, the surface must be thoroughly cured otherwise the mop will tear it to pieces, resulting in a milky appearance. Wet-and-dry papers are not used and if the surface suffers badly from 'orange peel' then the peaks will be shiny and the troughs dull. Do not attempt to go further or the surface will be damaged; finish with an ultra-fine compound.

After the paint has been compounded, give it a light T-cut followed by a thorough waxing. This will produce a mirror-like gloss that you will be proud of for years afterwards. It is preferable to compound and polish before you refit the trim as caked compound is difficult to remove from glass rubbers, interior trim and carpets.

Modern two-packs do not go milky and give a plasticky appearance. If a flat finish is required then, within one day of coming from the oven, the surface is flattened off with 1,200 wet-and-dry and soap (same procedure as cellulose) and then com-

**Below left, refinishing products for the perfect flat finish**

**Below right, cutting back old paint to match new paint on the rear wing. Wax must follow**

pounded with an ultra-fine compound. T-cut is not necessary and a liquid compound is used to remove the mop markings, followed by a thorough waxing. The finish is equal to cellulose but is far more resilient. Do not wait because as the two-pack comes to full cure the surface becomes harder and harder. Once that happens ultra-fine compound will not touch the surface and heavier grades will be necessary, resulting in score marks which will never come out; attempts to remove them will damage the surface for good.

In all cases if the edges are damaged then touch them up with a brush. Be careful, it only takes a second with a mop to destroy a beautiful panel; rectification will mean a repaint.

## Refitting

While the body has been painted, hopefully all the other parts, such as chrome and trim, have been refurbished. It is false economy to put back poor trim and old badges which will spoil a respray; a good respray will always highlight the condition of other parts. Usually badges and new rubbers are cheap but make all the difference; likewise don't reuse old clips and fasteners if new ones are available. In comparison to what has been spent on the body or panel, these small items are insignificant. With all refitting take time and care;

holes may have to be redrilled because of a build up of paint and doors may have to be rehung. When tackling the latter, or fitting doors on in the first place, tape a cloth along the sills and door-shut edges so that if the door drops or scrapes across the sill, damage won't result. Windscreens require care; cover the area around the aperture. Always use new bolts, nuts and screws, dipped in Waxoyl on metal cars to prevent rust in the future, when refitting parts. Attention to detail always pays off.

If an accident happens, as it invariably does, and a screwdriver slips and marks the surface it may be enough to just flat it out and then polish or to touch up with a brush, flat and polish. If these treatments do not remove the mark, then a local repair will have to be made and the area sprayed again.

## Decals

Some cars have acres of decals and tapes to place on after refitting. It is essential that the area is clean, achieved by T-cutting the position of the decal. This provides a key, since decals do not stick well on highly polished surfaces. It is essential that the temperature is at least an overall 20°C. If it is too cold the adhesive will not stick and the decal becomes brittle; too hot and it sticks too well, the decal expands and then shrinks back later on. If the decal is the Fablon type with a sticky back, just gently peel off a little of the back and





Above, accurate positioning of coachlines is critical  
Below, lightly tack a new coachline in place before firming it down and removing backing strip



position the decal correctly. When you are satisfied with the position, continue peeling off the back, pressing the air out as you go with a clean cloth, until it is all removed. With decals with a backing piece and a retaining front piece, remove the backing piece gently and tack in position until satisfied. Then gently firm down with a cloth and pull the front strip off. Some decals are very delicate and great care must be taken; if the decal breaks then another one will be needed.

### Coachlines

Painted lines can only really be done with the special cellophane lining tape. This is placed on the panel, the centre strip is pulled away and the line is painted in. When it is dry the remaining tape is pulled away, leaving a perfect coachline. Always T-cut the line area first (as for a decal) because paint won't take on wax. Make sure that the paint is compatible with the type that has been used – cellulose on cellulose, two-pack on two-pack.

Coachline tapes come in various widths and with single or double lines; T-cut the area and treat as for a decal. Stick the tape (if a coachline) on the rear flank and 'eye up' the correct line down the whole length of the car. When you are satisfied, dab the line down at strategic places (a two-man job) and, when correct, smooth the line down finally with your finger or a cloth. Peel off the top strip if it is of that type. In all cases wait a few days and then thoroughly wax the area; doing it immediately will allow the solvents in the wax to attack the adhesive.

### Polishes

Always use a good-quality, non-abrasive wax. The old-established ones are usually the best. Always polish using good-quality cloth (mutton cloth) with an even pressure and polish in straight lines. We all polish in circles but technically this is incorrect since the light is reflected from more places on the scratched surface. T-cut is done in the same way. This is a chemical cleaner with mild abrasive proper-

ties, not a wax, and it is essential that proper waxing follows.

Never use polymer resin polishes as they form a plastic seal over the car, allowing the paint to 'sweat' underneath because the surface cannot breathe. Also moisture gets trapped underneath and the finish goes milky. If a repair has to be effected after several applications of this polish, the only way to remove it is by flattening it off with wet-and-dry. These polishes are only good for museum pieces which never move off their stands.

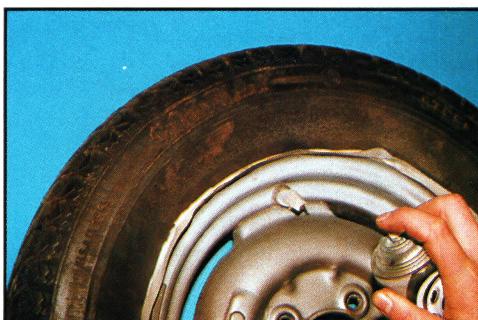
### Finishing wheels

Old, rusty, tired wheels will mar a good paint job; good results can be achieved here economically. Steel wheels may require just a repaint, but to do the job properly remove the tyres and then get the wheels professionally shot blasted. This saves time, costs very little, and the wheels are then ready to be primed in the usual way followed by the colour and lacquer if required. Spray in the usual way but take spe-

cial care to avoid runs as wheels are awkward shapes to paint. It is best to build up the paint with light coats. Wheels can be painted with aerosol cans to achieve the same effect. Most wheels of the Sixties and Seventies are stove enamelled, which means that the paint is baked on in an oven. The nearest to this is a two-pack but for all wheel types painting in an oven gives by far the best results.

Alloy wheels should be bead-blasted, as opposed to shot-blasted, to remove paint. Do not use a chemical stripper because if the alloy or magnesium wheel is porous then the chemical will sink into the pores and is virtually impossible to get out; eventually the new paint may react with the stripper and cause unsightly blemishes on the surface. Paint alloy wheels in the same way as steel ones but use a primer with high-etch properties for aluminium. If the wheel has a metallic finish then use the base coat and clear system to give durability; even with a solid colour you can finish off with two or three coats of lacquer to protect the wheel

Right, masking a wheel for a smartening paint coat  
Below, painted wire wheels look good for longer than chrome equivalents



## FINISHING

even further. Alloy wheels require maintenance to prevent corrosion so regular washing is essential. Do not repaint wheels if they are bent, cracked or severely corroded; always seek professional advice from alloy-wheel specialists if in doubt.

Wire wheels of the Fifties and Sixties through to the Seventies tended to be stove enamelled; if spokes have to be renewed entrust it to the professionals. Only consider refurbishing wire wheels as a cosmetic exercise. Gently



Above, painting wire wheels without creating a mass of paint runs is a tricky job

blast them and treat in the same way as the other wheels, just 'dusting' the paint on carefully in several coats. The spokes act as perfect run traps so take care to avoid puddles at the base of every spoke. Two or three coats of lacquer at the end will give that stove-enamelled look. If using aerosols, hold the can a little further away and roll the wheel as you spray. Allow the paint to dry thoroughly before the next application and so on; build up gently all the time. Again, two or three coats of clear lacquer at the end, or use of a 'steel wheels' aerosol, imitate a stove-enamelled finish.

# MAINTAINING THE APPEAL

*Prevention is better than cure . . .*

**R**EGRETTABLY stone chips are inevitable and are a source of great annoyance with their unsightly appearance on a perfectly-painted panel. If just a small chip, make sure the metal is clean and dry and carefully touch in using a tiny toy brush – the brush in the touch-up lid is usually too thick. Hopefully you retained some paint when the car or panel was painted; if not buy touch-up cans or paint sticks. If your colour is in aerosol form only then use the aerosol as a source of paint only; don't use the aerosol to paint a chip out, it's impossible to do! Shake well and spray a quantity into the lid and use the toy brush. When dry touch in again and build up until the surface is just proud of the existing area. After a week very gently flat off with 1,200 paper and soap. After a T-cut and polish, you will not know you had a stone chip. This is for perfectionists; most people usually just dab a bit of paint in the chip. With metallics, touch up with base colour and finally with clear lacquer.

If the chip has been left and rust has eaten its way into the surface, or if the chip

is severe, then the only satisfactory way is to treat it as a part repair and locally flat the area back to bare metal and repaint.

### Anti-corrosion treatment

Waxoyl is a household name and used correctly will preserve the car. Make sure the car's underside and wheelarches are clean, dry and mud-free. Drill holes in strategic places in box sections (if not already there), remove door trims and spray Waxoyl into all the nooks and crannies. Use an old spraygun at 60psi and stand the Waxoyl in boiling

water until it is very runny. Use a swivel head on an extension so that the insides of the box sections can be covered properly. Spray thoroughly in the wheelarches, doors and on the underside; anywhere that needs to be protected. When you have finished, plug the drilled holes with rubber grommets.

An alternative is to spray two coats of stone-chip paint underneath the car followed by sprayed-on underseal. Modern underseals are very flexible and really do offer protection, unlike the Fifties and Sixties types that set solid and trapped all the moisture until they fell off taking the floorpans with them. Even after spraying Waxoyl on bare metal leave it to set and then cover it with underseal. Always inspect the underside regularly, especially in the wheelarches as these are most vulnerable; the force of water from driving at 50–70mph in rain will eventually pull the underseal or Waxoyl off the metal. On GRP cars do not use Waxoyl as it serves no purpose whatsoever; use underseal for protection and for a decorative finish or edge in the wheelarches.

lose to attack from bird droppings, tree sap, acid rain and anything else that falls out of the sky, both types of finish need looking after. It is essential that any 'fall-out' on the surface is dealt with quickly, especially on newly-painted surfaces. Bird droppings will literally eat into the surface if left for weeks on end. Always wash the offending mess off immediately with warm water; if staining has occurred then a light waxing will be needed. Tar requires white spirit or petrol to remove it, followed by waxing. Cellulose requires more work to retain its lustre than two-pack; ideally thoroughly wax the car twice a year and once a year give it a good T-cut, followed by a wax, to remove all the road grime that eats into the top layers and restore the lustre. Cellulose looked after in this way (providing, of course, that it has been painted correctly in the first place and depending on usage and storage) will last a minimum of ten years. Two-pack should be given a thorough waxing once a year; eventually a build up of road grime will sit on the surface (two-pack is like a plastic film) and will need a good T-cut to remove it. If after a period of years the paintwork becomes dull, a professional mopping will work wonders to revive it.



3M's version of Finnegan's Waxoyl

### Looking after paintwork

Although two-pack is more resistant than cellulose

Finally, to finish off, hand-paint tyre dressing on the tyres and if possible renew wheel nuts or spinners, or refurbish the originals. Again it's attention to detail that counts.

### Chassis

To make the chassis look as good as new, assuming it has been stripped bare, the professional way would be to strip and powder-coat, to hot-dip galvanise or to stove enamel. With modern paints results can be achieved that will equal the professional way. The chassis must be thoroughly degreased, clean and dry with all rust removed; getting it shot-

blasted is money well spent. Primers can be varied but two coats of Bondaprimer (a resin-based primer) or zinc-based primers (Davids 182)

are an excellent start; even good old red oxide will do. When the primer has cured follow it with two coats of Smoothrite (rather than

Hammerite – no chassis left factories with a hammer finish) or similar. All these can be sprayed on or brushed on; ensure an even temperature of 20°C to achieve the best results. Alternatively, after the primer, spray with stone-chip paint followed by the top gloss coat. Finally, if the chassis is made up of box sections or hollow tubes, drill holes at regular intervals and spray Waxoyl into them; indeed before the body goes back on spray Waxoyl over the contact areas. Running gear and suspension parts can be done in this way as well. Any overspray can be wiped off with white spirit.



**Stone-chip protection coatings can be used under the paint on vulnerable areas**

# CAR CARE

### Washing

Always wash regularly but never use detergents, which are too harsh and leave streaks everywhere; instead use a wash-wax sachet in warm water. Never use a high-pressure hose either as this forces grit and dirt into the paint. Gently flood the car from the top rather like gentle rain, then wash with the warm water and wash-wax using a high-quality sponge – not a synthetic



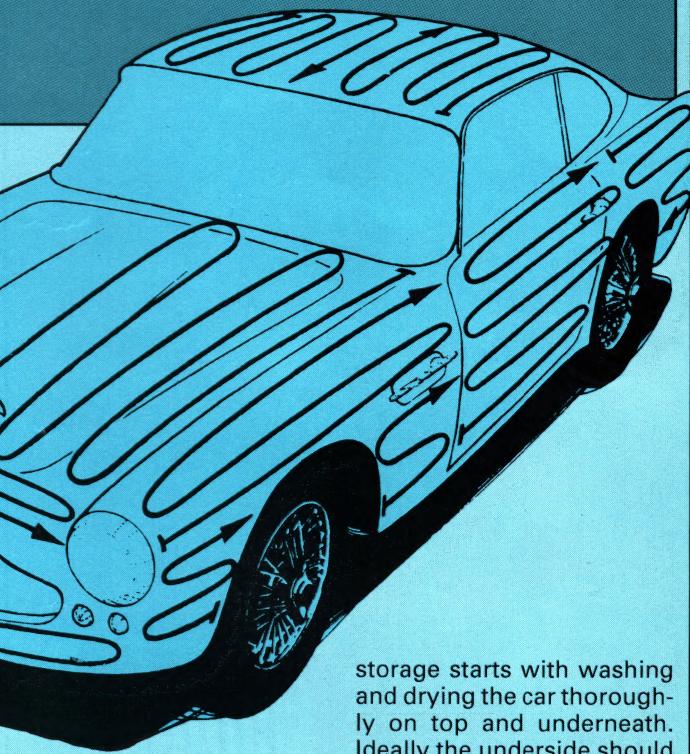
**Left, even this brush is too large for stone chips!**

nylon one which will scratch. Rinse with clean water and leather dry. Buy the best quality large natural chamois leather, synthetic ones are not the same. Always wash dust off; don't use 'magic wands' or brushes which rub the surface, they only scratch. Another tip is to keep a separate sponge for the wheels and

less important areas such as under the bonnet; replace the sponges and leather when they are past their best.

### Storage

Always ensure good air flow around the painted surfaces. Dark, damp, poorly-ventilated buildings will literally kill off the paintwork



and cellulose will have tell-tale microblisters all too soon. The ideal is a temperature-controlled (15-20°C) garage with good air circulation. Never use those plastic garages that go over the car; it is better off outside where the air can circulate around it. Likewise don't tie a plastic sheet over the car; the moisture can't escape and will be trapped between the plastic and the paint, marking it badly to the point of a repaint. The key to storage is a good airflow. Even if it is damp, the air is moving and with a warmer day the damp is moved on.

Preparation for lengthy

storage starts with washing and drying the car thoroughly on top and underneath. Ideally the underside should be steam cleaned gently to get rid of accumulated mud, after which the Waxoyl and underseal can be touched up as necessary. Wax the painted surfaces and apply chrome polish followed by wax to all the chrome. Disconnect the battery and leave the bonnet, bootlid and doors open by two inches to allow air to circulate freely around the boot/bonnet channels and door shuts. Failure to do this results in moisture build up and unsightly blisters on the underside of the bootlid and in the door shuts. When stored in this way, the body-work should not suffer for years.

# Classic Cars



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- ★ Materials and equipment ★ Fixing faults ★ Health and safety
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